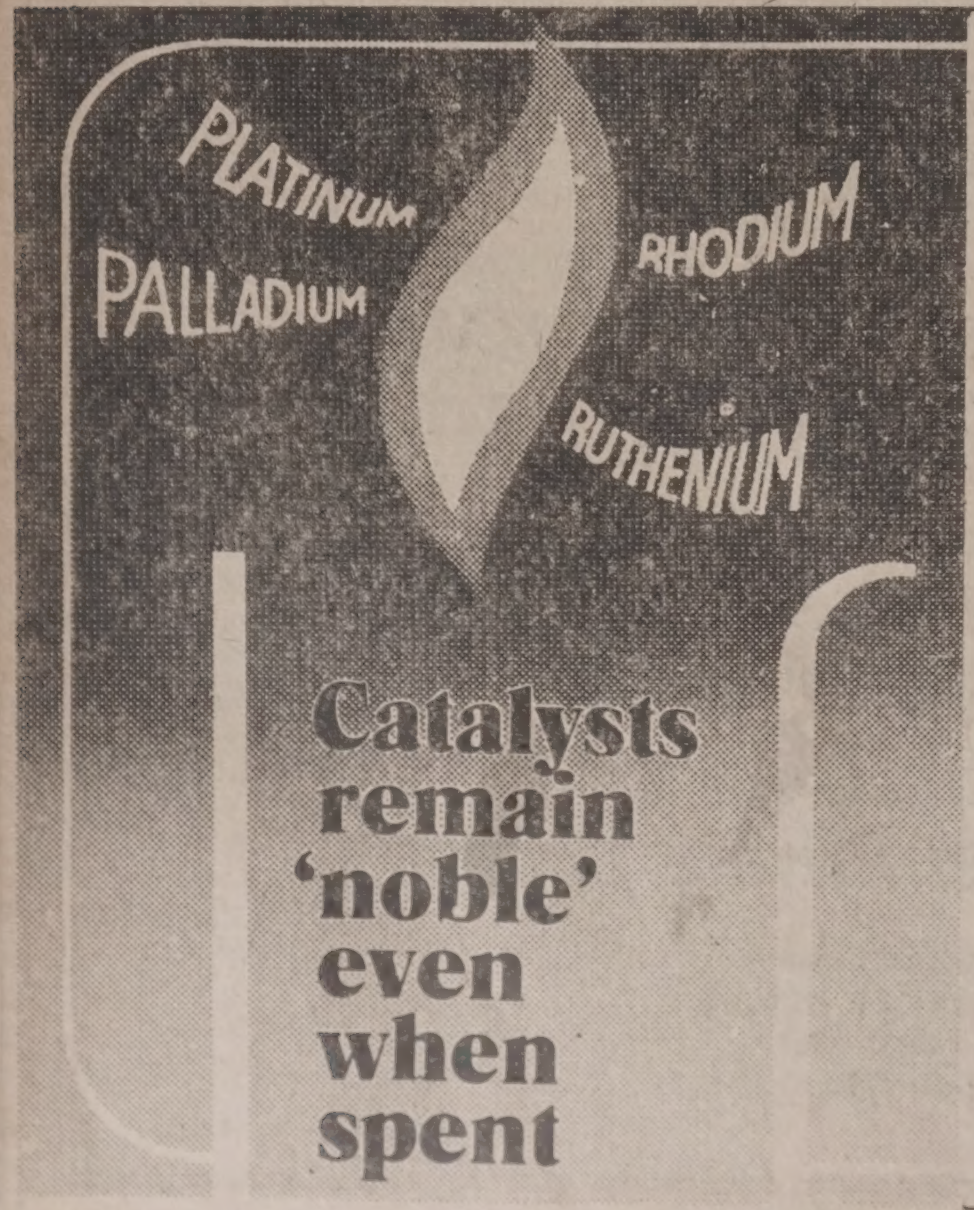
34th YEAR OF PUBLICATION

Chemical Weekly

VOL. XXXIV MAY 16, 1989 NO. 36

Edited by R. Raghavan and published by N.R. Rajagopalan on behalf of owners, Sevak Publications, 306, Shri Hanuman Industrial Estate, Wadala, Bombay-400 031. Madras Office : 27, Begum Sahib 3rd Street, 1st Floor, Mount Road, Madras 600 002. Phone : C/o 831808 and printed by N.R. Rajagopalan at Sevak Publications, 25, North Mada Street, Thiruvanmiyur, Madras 600 041. Phone : 419265. Registered with the Registrar of Newspapers for India vide No. R.N. 1972/57.



The Planet Earth is the greatest chemist we know.

What fecund and creative chemistry.
Every human, plant, animal, rock, gas or liquid on earth has a simple or complex chemistry behind it. The idea of so much thought and unconscious formulation seems mind-boggling, but Nature does it regularly and effortlessly. It inspires us.

Process chemicals for the textile industry for Sizing, Desizing, Mercerising, Scouring, Dyeing, Printing and Finishing.

SUPERTEX

SUPERTEX®

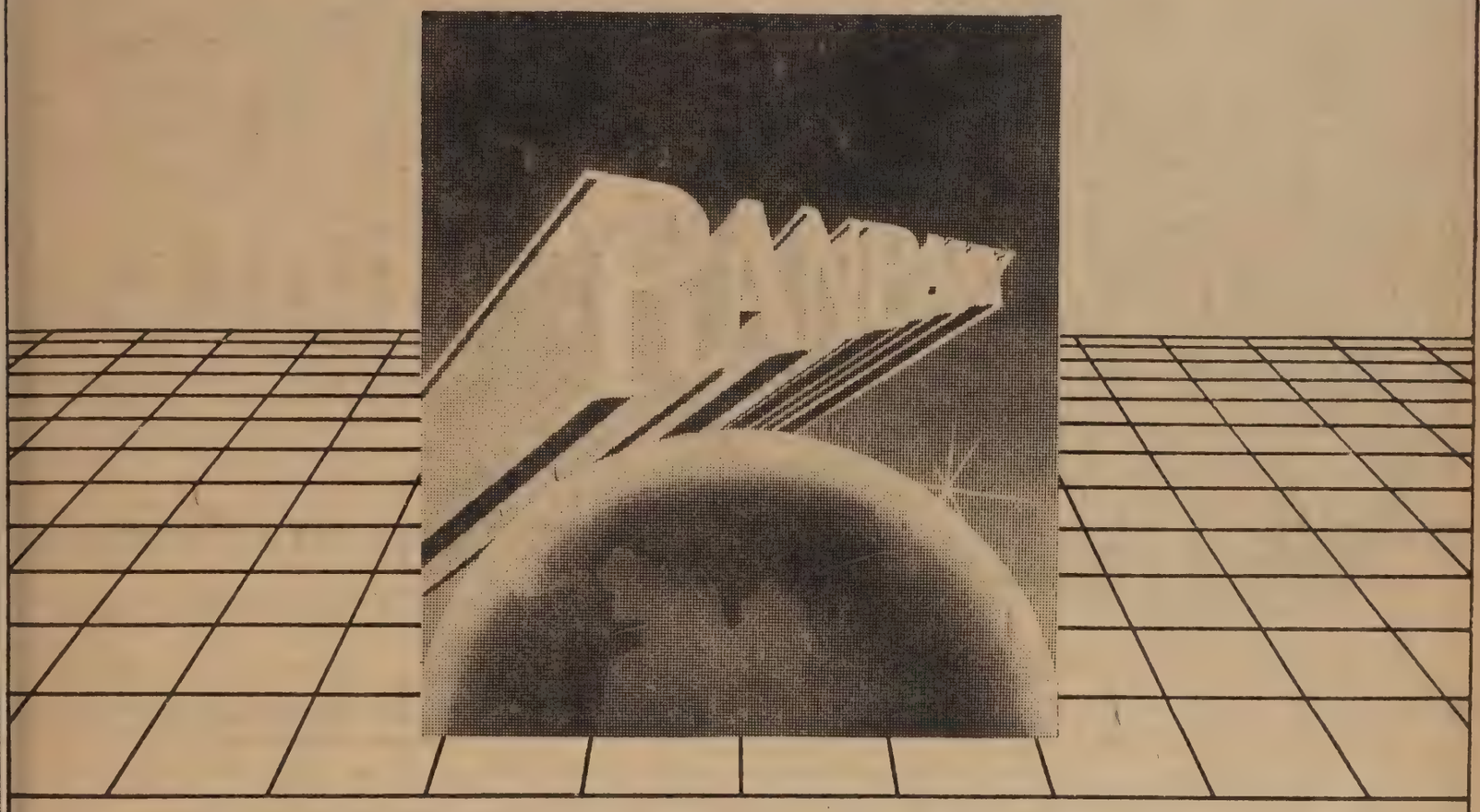
(INDIA) CORPORATION

132, Dr. Annie Besant Road, Bombay-400 018
Phone: 493 6041, 493 38 18, 493 5482.
Grams: 'Thinogum'. Telex: 75643.

a M.G. Saraf Enterprise
Most trusted name in chemicals

Ranbaxy's High-Tech Bulk Drugs

Tested to international standards



No. 1 in exports.

Ranbaxy has achieved the singular distinction of emerging as the largest exporter of bulk drugs from India — A tribute to its quality standards which have been accepted the world-over.

A comprehensive range:

Ranbaxy's bulk drugs include the following products:

1. **Ampicillin Trihydrate IP/BP/USP. (Compacted/Syrup/ micronised)**
2. **Amoxycillin Trihydrate IP/BP/ USP (Compacted/Syrup)**
3. **Cephalexin Monohydrate IP/BP/USP (Compacted/Syrup)**
4. **Chloroquine Phospate IP**
5. **Cloxacillin Sodium IP/BP**
6. **Doxycycline Hydrochloride IP/BP/USP**
7. **Nalidixic Acid IP**
8. **Norfloxacin**
9. **Ranitidine Hydrochloride**

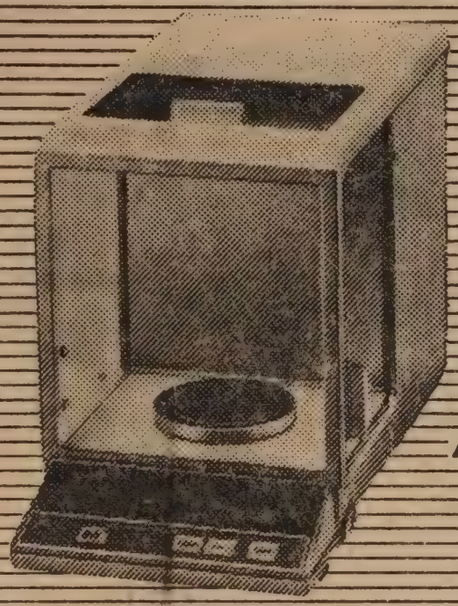
For your requirements, please contact:

RANBAXY LABORATORIES LIMITED

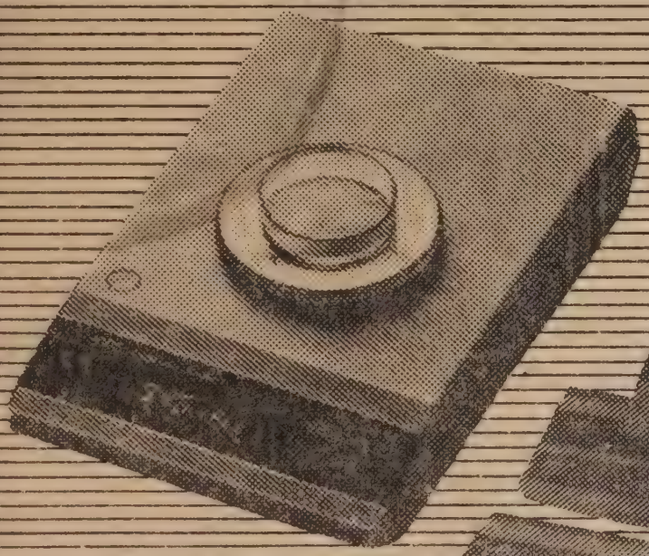
Chemical Division Marketing Office
16, Marina Arcade, Connaught Circus
New Delhi-110001
Phones : 3323738, 3323739
Telex : 031-63487
Cable : RANBAXYLAB
CONNAUGHT CIRCUS, NEW DELHI

Rated best by every test!

Only from Afcoset.
A range so wide. Features so advanced. Quality that's unmistakably world class.



Analytical Balances



Multi-function Balances

Industrial Precision Balances

Ask Philips, Sandoz, Rallis, Ranbaxy, IIT, WIDIA .....

Right here in India, Afcoset brings you state-of-the-art technology that compares with the world's best.

That's because Afcoset Balances are manufactured in collaboration with world leaders A&D Co. Japan at a sophisticated plant, manned by highly qualified engineers trained in Japan.

Afcoset Balances are available against rupee payment. No need for import licences. No fear of non-availability of spare parts or slack after-sales service.

The multi-function features can meet the most diverse and exacting weighing needs;

- Scientific research & analysis
- Laboratory and industrial applications; the gem and jewellery trade
- High precision industrial weighing

Accurate. Electronic. Rugged.

Afcoset

BALANCES

Licence A&D Japan

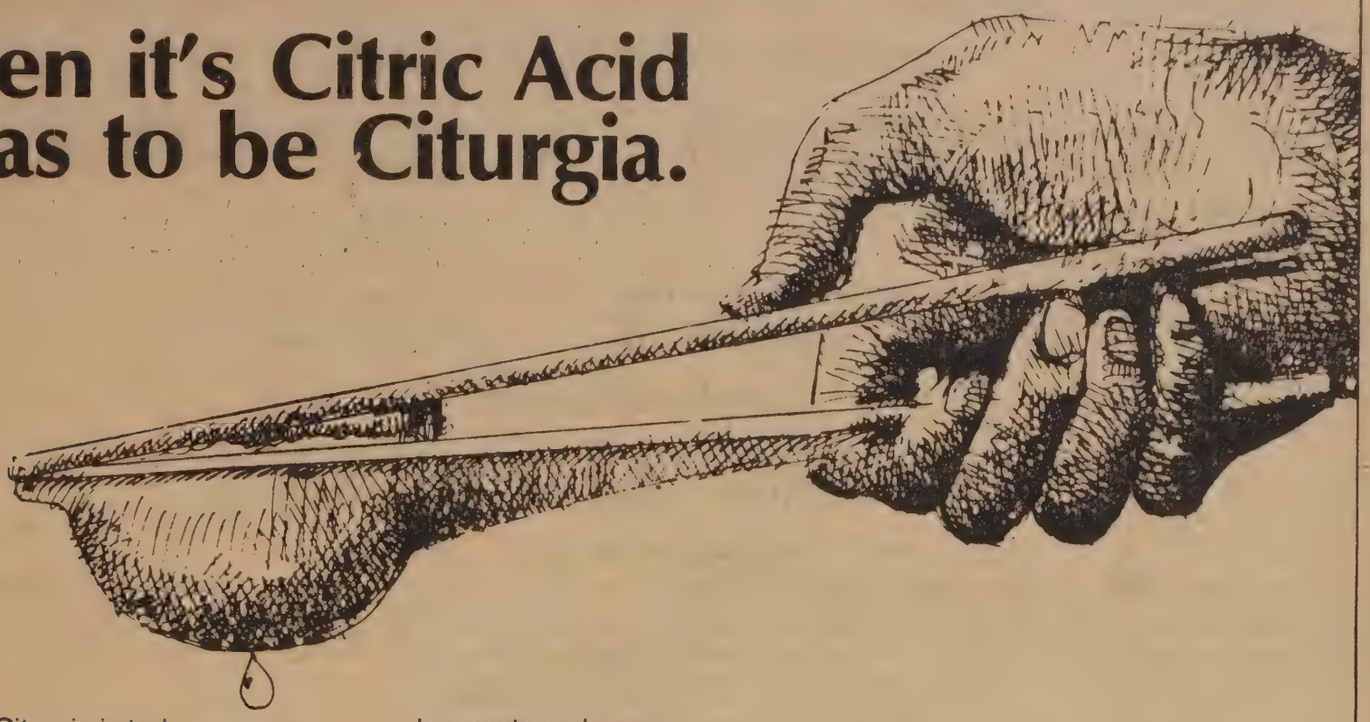
The Bombay Company Limited

334, A to Z Industrial Estate,
G. Kadam Marg, Lower Parel Bombay 400 013.
Tel: 4944384, 4938218; 4938219
Tlx: 011-76779 DPIL IN

Regional Offices: New Delhi Tel: 5721439, 573 0120 Madras Tel: 472491 Bangalore Tel: 235657, 235803 Hyderabad Tel: 241720.

SEASONS/BCL/213

When it's Citric Acid it has to be Citurgia.



The name Citurgia is today synonymous with Citric Acid of the finest quality. Citurgia caters to more than just one need in more than just one industry. Besides the traditional usage of Citric Acid in food, soft drinks, confectionery and drugs, today the uses of Citric Acid extend to new areas:

* In the textile printing and dyeing industry it provides 'STABLE pH' conditions for polyester and nylon. As also for acrylic prints curing and cotton-resist printing. Citric Acid has successfully replaced imported Tartaric Acid because of its excellent quality, low costs and easy availability. Also, it is a very safe acid compared to other organic and inorganic acid salts.
* Citric Acid prevents flavour deterioration, rancidity and discoloration in edible oils.
* It imparts an acidic taste to dry powdered drinks.
* It is also used as a descaling solution.

Citurgia Biochemicals Ltd. is the largest producer of high quality Citric Acid in India. Besides catering to the domestic demand, Citurgia's Citric Acid is exported to USA, Japan, Germany, Australia, Iran, Malaysia, Sri Lanka and other countries.

Citurgia Citric Acid India's No.1

CITURGIA BIOCHEMICALS LIMITED

Regd. Off: Neville House, J.N. Heredia Marg, Ballard Estate, Bombay 400 038
Tel: 268071 Gms: CITURGIA BOMBAY.

Tlx : 11-73372 BDM IN

CS/285

CHEMICAL WEEKLY

VOL. XXXIV MAY 16, 1989 NO. 36

HERALDING THE 21st CENTURY - 20

Energy options — Conservation to the Fore

The oil market upheavels of 1973 ushered in an era of introspection. Of the many devoutly held beliefs to be given the go, by three were most significant. The common belief that energy outputs would need to double in the last quarter of the century (1975-2000) was the first to be abandoned. Another assumption, that a healthy growing economy requires growing supplies of energy could not stand the test of scientific scrutiny. A third glib assumption to go was that electricity would continue to maintain the established pattern of claiming a steadily increasing share of the total energy use.

Energy technologies concentrated their attention on increasing energy supplies in forms other than oil. Economists evolved concepts of zero energy growth or even negative growth. Conservationists came out with convincing proof that at least in the field of energy, one can get more from less. Achieving higher productivity with lower energy input is not a slogan, it is a reality.

The United States used 76 quads of primary energy in 1980. A quad (quadrillion British Thermal unit) is equivalent to the energy content of about 500,000 barrels of oil per day for a year or about 40 million tonnes of coal or the output of sixteen large power plants running normally for a year. When electricity is generated about two thirds of primary energy involved is lost at the power plant as waste heat. SERI (Solar Energy Research Institute) is projecting an overall efficiency gain of 33% by the year 2000 if cogeneration of electricity and heat is included while the CONAES study visualised a 10% gain by 2010) and a long range gain of 50% to 600% of the heat currently lost as waste heat.

Currently 34% of the natural energy demand is from residential and commercial structures, 25% from the transportation, with industry and agriculture accounting for the rest. Spectacular breakthroughs have been achieved in energy conservation in every one of these three sectors in the United States as well as other countries.

Residential and commercial structures now exist that require virtually no conventional energy for space heat, which is currently the largest end use in the buildings sector (34%). Modern comfort standards found in centrally heated buildings are maintained in new structures by solar heat at costs well below the long-run marginal supply prices for new energy supplies. A study by the Solar Energy Research Institute (SERI) has concluded that over 90% of space heating needs can be met from non-conventional energy source.

Lennox in 1984 offered an airconditioner with an energy efficiency ratio of thirteen -- more than twice as efficient as the ones in use. Researchers at the Florida Solar Energy Centre are developing a passive cooling/dehumidifying technique, based on a dessicant like silica gel, which is expected to revolutionise the field of space heating and cooling. All over the western countries, energy use per household has been declining since 1978. In the field of illumination, Phillips is now offering a 19 watt bulb with an incandescent power of 75 watt.

In the transportation sector, the automobiles account for 45% of the 19.7 quads of energy consumed. The U.S. automobile sector had the questionable distinction of using "gas guzzlers" with a remarkably low average of 4.5 km. a litre. Even America could not afford this luxury. By 1980, the figure had improved to 6 km./litre. The ultimate target is 28 km./litre. This is not a flight of fancy. Bateille Memorial Institute has proved theoretically that with the existing energy efficiency raising techniques, it is possible to build a vehicle operating at 100 miles/gallon or 35 km/litre, a figure, which is already reported to have been achieved in a prototype vehicle built by Renault.

Efficiency gains in truck freight are steadily being achieved with air deflectors and improved maintenance standards. Rail efficiency gains are also taking place even though they are not spectacular. Between 1972-1982, American Railways have shown a 24% improvement in fuel efficiency. For air transport, new models like Boeing 757 and 767 are 35 to 40% more fuel efficient per seat mile than the earlier aircrafts. The next generation of aircrafts, already well ahead in design, promises to add another 15 to 20%. Air transportation engineers have a target of 50% saving in energy needs by the turn of the century.

Industry represents the third major energy consuming sector. It includes agriculture, mining and construction, as well as manufacturing, which by itself is a heterogenous sector, with a highly concentrated energy consumption profile. Six major industry growths (metals, paper, petroleum refining, chemical, some quarries, clay and glass products and food processing) account for 80% or more of manufacturing energy use. Industry responds quickly to fuel price changes or even prospective changes. This sector, in advanced countries, is committed to an energy gain target of two thirds of the present consumption.

Two thirds of industrial energy consumption goes to two main uses -- process heat and mechanical heat. Both areas present abundant opportunities for more efficient energy use. Electricity is a versatile source of energy. The real cost of electricity is seldom realised. One kilowatt hour provides 3413 British thermal units. To buy one million BTUs one must buy 293 Kwh. At 12 cents a kilowatt (Rs. 1.80/unit) it costs more than $35. One barrel of oil contains 5.8 million BTUs or 5.8 times $35 = $203. This is the simple arithmetic behind the astounding statement by the world renowned energy expert Lovins in his "Soft Energy Paths" that bringing electricity at 12 cents a kilowatt is like buying a barrel of oil at $203. This explains succinctly that electricity is not likely to make greater inroads in energy markets, especially in industrial applications.

Electricity is irreplacable in lighting, refrigeration, space cooling (till the desicant process takes shape), electronics, electroplating and industrial motors. Industrywise potentialities for energy conservation reveal glaring contrast even between advanced western countries. It is well known that US production costs in steel are high because of exhorbitant labour costs and partly due to outdated machinery. A well designed new steel plant in the United States with continuous casting, heat recuperation, by-product gas combustion, and cogeneration can effect 55% energy reduction over existing practices. U.S. steel makers use an average of 36 million BTUs per delivered ton. Sweden used 26 million BTUs and Japan has already achieved 16.8 million BTUs.

New processes for aluminium reduction, the most energy intensive step in the transformation of ore, reduces energy consumption by a third. Still newer technologies in the pilot plant stage in Japan indicates further possibilities. Dow Chemical in 1975 listed ways in which long term savings between 50 and 60% can be achieved in paper manufacture.

The widely divergent chemical industry is the largest single energy user in the industrial sector. It uses gaseous, liquid and solid hydrocarbons both as fuel and feedstock. Union Carbide reduced its energy use per pound of product by 15% in six years. The current target is 30% in thirteen years. The chemical industry is the prime candidate for cogeneration. Petroleum refining is subject to energy reduction on two counts -- both -- process efficiency and reduction in use due to increased efficiencies in the conservation sector. The former alone can register a 20% fall.

The fertiliser industry in the USA consumes between to 10.9 million kilocalories per tonne of fertiliser. In I in the initial stages the figure was as high as 13.5 mil Kc. Energy consumption in the newer process will be c to 6.8 million Kc. The float glass process reduces energy in making flat glass by 30%. In case of glass container in try -- bottles for beverages and foods -- a staggering 7 reduction in energy consumption is forecast. Union Carb announced a new process for polyethylene whose energy c are reported to be between one sixth to one ninth of the c ventional process. Westinghouse advertises induction he ing in forging, stamping and annealing metals backed by claim of energy cost reduction of 30% or more.

A chemical extraction process for solvents developed the Department of Energy has wide applications for ph maceutical, chemical processing and waste treatment. S vents now recovered from water by energy intensi distillation instead can be recovered in a process using co densed super critical gases. Possible energy savings rea 80%. This process may work for separating ethanol fro water, thus reducing the cost, and increasing the net ener yield of fuel alcohol.

It is commonly asserted that Western Europe and Japa use energy much more efficiently than the United States. Mo European nations and Japan do indeed use less energy p capita and per unit of Gross National Product than the Unite States. In a global survey of advanced nations, the USA an Canada stand out as relatively energy inefficient. The deman for energy seems is the highest in the States. The averag American drives more miles and uses larger area of heate surface for domestic and official comfort.

Sweden is already recognised as one of the most effcien energy users in the world. A study of the United Kingdon system reveals the potential for four fold gains in energy use The West German study reveals the prospects of five-fol savings in energy. The most outstanding case is that of Den mark. Over a decade energy use fell by 17%, while outpu rose by 22%. The average annual decline in the energy con sumption rate has been sustained for a decade; the other cas is Japan where energy use per unit of Gross National Pro duct is already the lowest amongst industrialised countrie of the world. Europe and Japan have attractive energy effi ciency renewable energy future. With these futures, come relief from heavy dependence on imported fuels that have loomed large in discussions on trade balances.

If one examines the price paid by the EEC countries for food self-sufficiency, it appears that energy self-sufficiency can be achieved less dearly. After all every country is endowed with solar energy and a good many have a long sea shore. Thus there is at least one area where pessimism need not be extended to the next century. With conservation of conventional fuels and development of non-conventional sources, there need be no energy famine in the coming century.

-- T.P.S. RAJAN

CHEMARENA

.L. VENKITESWARAN

Brazil's problems with Ethanol

Brazil, with all its raging inflation and mountain of debts, now facing poblems in continuing the heavy subsidies on e ethanol fuel programme. In the period of over a decade, razil has ceated a revolution in the automobile transportaon. On one side, the sugar and sugarcane producer was ppy with the outlet for enormous quantities of sugarcane d molasses at remunerative prices while on the other side e motor car industry came up with the designs and proction of vehicles using neat ethanol as fuel. The country's reign exchange position benefited by the reduced imports petroleum at the ever escalating prices of the seventies d early eighties. The situation has changed due to the low ice of crude oil and some production of oil by Brazil which as reduced the need for any drastic measures on the import de. The high level of subsidy on ethanol is a large burden n the country's economy. In this context there seems to be build up of criticism on the ethanol fuel programme.

But there are other aspects which arise when attempts are ade to disturb the Alcohol-Fuel Programmes which are now eeply entrenched in the social and economic fabric of the ountry. Brazil produces over 11 billion litres of alcohol a ear and there are already a million cars running on neat alcol and out of the production of cars, 75% are of this type hile the balance are best run on the 80:20 gasohol. The polital clout of the Brazilian agriculture and sugar lobbies is much as that of the Government Corporation Petrobras, e oil company which markets all petroleum fuels, and is bliged to export some naphtha at low prices due to the stricted petrol market. The chemical use of ethanol is at low level relative to the availability and limitation of marts due to the extensive build up of petrochemical sector. he use for chemicals is of the order of 420 million litres year mostly for acetaldehyde derivatives in a number of ants as detailed in the Table alongside.

In the beginning the price of ethanol for chemicals was ed at 35% of the price of petro-based ethylene. The price neat fuel ethanol has been raised from 45% of the blend hich is governed by the price of petroleum products) and being raised to 75% now. Petrobras markets all the fuel anol and so is expected to realise overall profits but the oblem is now said to be the larger proportion of unsold phtha which has to be exported at low values. The National ergy Commission is the authority to set prices and has taken steps to bring up the price of blend and of fuel ethanol to parity with gasoline.

Price is not the main problem, but the cars on the road and what are produced. There is now a move to reduce the number of cars designed for neat ethanol to 60% from the present 90% by 1995. There are moves to step up efficiency of ethanol production in some of the older plants but there is great resistance and opposition to any disruption of the ethanol industry. One estimate of the "social costs" or subsidies on the ethanol fuel programme is $50 million per month or less than 5 cents per litre. The price subsidy is not the real problem but the market for refinery products. Presently 16% of refinery distillates is as gasoline, and about 40% diesel on which there is no ethanol to blend.

While fuel production and use pattern is going to be very important the pricing of ethanol is a political issue and there is not much likelihood of any setback to ethanol programmes.

Table

Company	Products
Salgema	Ethylene
Rhodia	Acetaldehyde Ethyl Acetate Acetic Acid Ethyl Ether
Elekelroz do Nordeste	Acetaldehyde Ethyl Acetate Butanol Octanol
Coperbo	Acetaldehyde
Cloroetil	Acetaldehyde Ethyl Acetate
Oxiteno	Glycol Ethers
Union Carbide	Ethylene
Cia Brazziera re Estireno	Ethylene Ethyl Chloride
Victor Seuce	Acetaldehyde

Henkel in a big deal

Henkel of West Germany, one of the largest producers of oleochemicals has completed a big deal in takeover of Emery Chemicals of USA for a reported $480 million. Emery had been taken over by Quantum Chemicals (successor to Vista Chemicals of Conoco which was shed off at the time of merger with Du Pont) and is now sold off except for the poly-alpha olefines business and production in which Quantum is interested. This business of acquisition and shedding off segments not of primary interest is now a regular feature of some of the large takeovers. Henkel who have about 600 to 700 million dollar sales in USA will increase it to $ 1 billion -- a sixth of their worldwide sales. Henkel, the number two in oleochemicals moves closer to Unilever. They have already taken over other smaller firms in the speciality sector of metal pretreatment and other areas. It has also large interests in Loctite adhesives and in Chlorox. Henkel is reported to be tying up with T.N. Petroproducts of India in detergents.

There is also news of another big European takeover o US producer -- Pennwalt Inc. by Elf Aquitaine. Elf Aquita ine has a large and controlling interest of French Goverr ment and sales of more than $20 billion of which one thir are chemicals. Elf has already acquired M & T Chemical and Texasgulf and has US assets of over $ 3 billion and sale of $1.3 billion.

Pennwalt which has a fabrication set up in India for Shar ples ultra centrifuges had other interests in pharmaceutical and other areas. It had also sold off the Sharples-stock equip ment decision to Alfa Laval and its Werner and Tierna equipment division to another buyer. Its Italian subsidiary making methylamines is sold to Akzo and is now reduced to a billion dollar sales level of mainly specialities and inter mediate chemicals. The merry go round of takeovers and sheddings continue.

Kites with high-tech parts

Kites may be mostly for children and of paper on a wodden frame and soaring on a cotton string (or nylon) but the high-tech invasion has made kites into high cost and sophisticated produce these days and no more kidstuff. Gayla Industries of Houston, USA, had changed the picture with a polyethylene keel guided triangular delta model 30 years back. Now many others are on the trail of high fliers. "You can't sell paper kite anymore" in USA and 95% are ripstop nylon or nylon or polyethylene. Go Fly a Kite Inc. of Connecticut has far greater strength due to its nylon artificial fabric and costs over $12 while polyethylene ones cost $ 3.50. Larger kite frames are no longer made of wood but solid fibreglass rods and tubing and some are 12 to 16 square feet. Some stunt kites are said to have even carbon fibre and costs upto $ 100 while Japanese handmade specialities with designs could cost more than a motorbike. Advanced material, have made revolutionary changes. Aerodynamic designs are now more common, mostly triangular designs with even wings - some imitating the major aircraft models like F-16. There are also trains of kites on a single string -- even a record 254 kits on a single string. The altitude record is said to be over 37,900 feet on a Gayla Super Bat and six auxiliary kites.

We have the kites mainly for a few days in a year with attempts to cut strings and capture falling paper kites and the Japanese are even more active with kites. We should think of adopting kite designs on the modern hightech systems and may be they could fetch sizeable export earnings.

Advances in Pulping

The conventional acid (sulphite) and alkaline pulping methods may give way progressively to newer methods which are lower in the cost of energy or chemicals required. The "steam explosion" process developed by Stake Technology of Canada is being installed for a 100,000 tonnes a year pulp mill with an overall investment of $96 million. The wood chips pretreated with sodium sulfite and caustic soda (impregnated) passes continuously through a Reactor under 200 psig steam with a residence of a minute. The discharged chips get into a depressurised vessel from where the pulp is subsequently separated. The yield of pulp is said to be 90% of theoretical with 50 to 80% last energy and the fibre strength is as good as conventional kraft pulp. The residues can be processed for recovery of lignin or for burning. The Stake technology was proposed as a way to get clean cellulose separated from wood and used as a source of sugars by enzymatic hydrolysis. Some applications on these lines are reported in trial runs though no commercial operations have emerged. Hence it is good that the process is being adopted in pulping for paper plants.

Another process also developed in Canada -- pulping with alcoholic caustic -- is also being taken up for a trial unit of 33 t/day which will later be expanded to 250 t/day. The process termed Allcell process operates at 200°C and 400 psig with alkaline alcohol, either ethyl alcohol or methanol. No other catalyst is required and the pulp is processed with removal of liquor and washing in the same vessel. Alcohol is recovered from the liquor and recycled while the residues go for burning. The trial plant is being set up by Repap Enterprises at Oakville, Ontario. The pulp is of kraft grade and energy and caustic soda needs are said to be reduced. The use of enzymatic digestion of wood flour is however not for the near future.

For Competitive Imports of Chemicals, Pharmaceutical Raw Materials and Particularly for the Following Items

Benzaldehyde
Propiophenone
Isobutyrophenone
Dicyclohexyl Ketone
N-Butyrophenone
P-Methyl Propiophenone
Methylene Dibromide
2-6-Dichloro Aniline
Thiophenol
Glyoxyllic Acid
Succinic Acid
N-Chloro Succinimide
1-4-Dioxane
Tert. Butanol
Diglyme
Dimethyl Sulphoxide
2- Ethyl Hexyl Chloroform
Methyl Chloroformate
Pivaloyl Chloride
Lauryl Chloride
N-Dodecyl Mercaptan
Methane Sulphonic Acid
Methane Sulphonyl Chloride
Tert. Amyl Alcohol
M-Toluic Acid
Trimethyl Phosphite
Thioglycollic Acid
BHA
2-Chloropropionic Acid
2-Ethyl Thio Ethanol
Epichlorohydrine
Propylene Glycol Tech/BP/USP

PLEASE CONTACT WITH YOUR SPECIFIC REQUIREMENTS

CHEMET

HEAD OFFICE:
Taj Building, 1st Floor, P.B. No.195,
210, Dr. D.N. Road, Bombay-400 001.

Phones: 2043803/4/5/6/7
Fax. No. 2048854
Cable: DEGUCHEM Bombay
Telex: 11 3229/11 4631 DGKM IN

CALCUTTA OFFICE:
Sharma House, 3rd Floor,
1/2, Lord Sinha Road, Calcutta-700 071.

Phones: 447306/446155
Cable: DEGUCHEM Calcutta
Telex: 21 3325 DGKN IN

MADRAS OFFICE:
10, Kondy Chetty Street, 1st Floor,
P.B. No. 1709, Madras-600 001.

Phones: 582447/587617
Cable: DEGUCHEM Madras
Telex: 41 7554 DGKM IN

DELHI OFFICE:
214, Hans Bhavan, Wing No. 1
Bahadurshah Zafer Marg, New Delhi-110 002.

Phones: 3311373/3319787/3319791
Cable: DEGUCHEM New Delhi
Telex: 31 65921 DGKM IN

HYDERABAD OFFICE:
905/2, 9th Floor, Babukhan Estate,
Basheerbagh, Hyderabad-500 001.

Phone: 242318
Telex: 0425-2188 DGKM IN

Reliance venture awaits final clearance

The offer to raise nearly $ 900 million in foreign exchange, either by way of equity or loan from reputed international companies in the petrochemical field, if it were allowed to set up the integrated petrochemical complex, combining the gas-cracker and all downstream units at Hazira in Gujarat, seems to have clinched the deal for Reliance Industries Ltd. (RIL).

All the departments concerned including the Departments of Economic Affairs and Chemicals and Petrochemicals and the Industrial Ministry have approved the proposal for an integrated-complex and it will be forwarded now to the Cabinet Committee on Economic Affairs (CCEA) for clearance.

RIL submitted a proposal to the government in late December 1988 for setting up a unit to manufacture 80,000 tonnes of styrene and 30,000 tonnes of polystyrene, costing Rs. 161.46 crores in Chorasia taluka in Surat district of Gujarat. This unit was to have been one of the downstream units of Hazira gas cracker complex for which the company had recieved the Letter of Intent (LOI) in November 1988. Prior to the grant of the LOI, the question of setting up a petrochemicals complex at Hazira was considered in great detail by an inter-Ministerial Committee which concluded that it would not be possible for a single party to raise resources for setting up the mother-cracker as well as all the downstream units.

Downstream units:

Accordingly, it was decided that the mother-cracker and some downstream units would be set up by one party and the other downstream units by other parties, both in the private sector and/or in the State public sector, though in the past, IPCL, MGCC and Haldia were considered on the basis of one integrated unit, inclusive of cracker and downstream units. Thereafter, a special Project Approval Board (PAB) agreed with the recommendations. It was then specified that RIL will utilise about 50% of ethylene for its downstream units and the government will have the right to allocate the balance ethylene and propylene for other downstream units. A suitable mechanism was to be evolved to ensure equitable distribution of ethylene and propylene to all units.

Product pattern:

The Department of Chemicals and Petrochemicals later set up a committee for suggesting the product pattern of the downstream units, taking into account the demand-supply gap, the minimum economic size, capacity etc. The approved pattern was HDPE 100,000 tonnes per annum (tpa), LLDPE - 100,000 tpa, PVC - 100,000 tpa, MEG - 60,000 tpa, Styrene - 80,000 tpa, Polystyrene - 30,000 tpa, Polypropylene - 50,000 tpa, ACN - 70,000 tpa, SBR - 80,000 tpa, Butyl Rubber -25,000 tpa, Isoprene 1000 tpa and CP/DCP - 7,5000 tpa respctively.

RIL's representation:

But just after these allocations were made, RIL represented to the Industry Ministry for sanction of the entire Hazira complex as an integrated unit. It argued that it would be able to attract funds upto $ 900 million in foreign exchange by involving well-known international companies in the form of equity or loans if it received the sanction for an integrated complex. Besides, RIL also pointed out certain economic advantages like lower capital outlay, better capacity utilisation and saving of operating cost because of integrated utilities and offsites, R & D facilities, product application and development centre and marketing of the products.

The Industry Ministry also felt that with the integrated arrangement, the apprehensions expressed in the earlier arrangement about equitable distribution of ethylene at reasonable prices would not be relevant any more and optimal use of ethylene-based projects in an integrated complex could be ensured. In support of its contention, the Mini referred to the units of IPCL, MG and Haldia, which were all integra units. Accordingly, the Minis approved in favour of RIL downstre projects which included an increase the capacity of HDPE in the pres licence from 50,000 to 100,000 t LLDPE at 100,000 tpa, styrene 80,0 tpa, polystyrene 30,000 tpa, polypro ylene 50,000 tpa, polypropylene 50,0 tpa, ACN 70,000 tpa, SBR 80,000 t and butyl rubber 25,000 tpa.

Economic viability:

In December 1988, the special Pr ject Approval Board considered thes views. It was pointed out that interna tional petrochemical giants like She and others considering financial and t chnical participation in the project, ha expressed the view that on techno-eco nomic considerations, it was better to se up an integrated complex, as it woul improve the economic viability of th project as a whole. The World Ban which had also reportedly expresse interest in financing the project, in pre liminary discussions, indicated that o techno-economic grounds, an integrate complex was a better proposition.

Cleared from all angles:

Highly places sources said that th revised proposal was cleared from al angles by the Industry Ministry in the 3rd week of April,'89. The company had informed the Ministry that it woul be able to commission the cracker and downstream units simultaneously. The project cost has been estimated at over Rs. 1,250 crores. RIL has informed that in the event of any time gap between commissioning of the cracker and the downstream units, it would have to import the feedstock, ethylene. In any case, it did not expect the time gap to be more than 6-9 months.

Pollution control and safety:

The Industry Ministry has asked RIL to make a commitment to the State and Union govt. that it would instal the appropriate equiment and take necessary steps for pollution control.

O.P. KHARBANDA

FRANKLY SPEAKING

Dr. O.P. KHARBANDA, Cost & Management Consultant,
501, Olympus, Altamount Road, Bombay-400 026.

Raiders and how to fight them

Raiders are a despised lot in the corporate world, but the subject is being taught in business schools and at the same time strategies to fight the raiders are also being developed and refined. We bring you here a summary of some of the recent literature on this exciting subject.

A raider, like Ivan Boesky, may well pose a philosophical question: (WALL STREETERS TURN TO THE CLASSICS, Fortune August 17, 1987 page 92):

If I am not for myself, who will be for me? But if I am only for myself, what am I? Raiding (taking over of companies -- not by 'hook', but by 'crook') is essentially an American phenomenon, but it slowed down considerably towards end of 1986 with the revelation of a Wall Street-style insider trading scandal and the centre of gravity shifted to the continent. But the Guinness scandal in UK slowed such activity in Europe as well. Much has already been revealed in both cases, but it represents perhaps only the visible part of the 'iceberg' and media (investigative reporters) may yet unearth the hidden nine-tenth part of this iceberg. The phenomenon has attained worldwide dimensions and no country is now immune from raiding on companies. In an interesting article (Shawn Tully: EUROPE'S TAKEOVER KINGS, Fortune, July 20, 1987, pages 95, 96, 98), the raids across national boundaries are described. In order to meet the competition from American and Japanese companies, the European companies see the need to be bigger and more international. And after building a strong presence in Europe, they aim to spread into world markets. In the words of president of the Ferruzzi Group (an Italian food-processing and chemicals company) who has made some $2.5 billion worth of acquisitions in 1986 alone:

In the past, European companies were provincial. Now they want to be Europe-size. Europe is our country. The real temptation for a takeover king and raider is an undervalued asset and this is a reflection of poor management. The real defense against a raider is therefore good management and high share price. A unique European phenomenon, privatisation, is also triggering a spate of takeovers as the route to growth in the international marketplace. The Fortune article describes the activities of not only the familiar faces (e.g., Sir James Gol smith & Carlo De Benedetti), but also some newcomers (e. Vincent Bollore in France & Pasquale Pistorio in Italy) wi activities far beyond their national boundaries. And to tea the finer points of the game of raiding, Asher Edelman to conduct a course at Columbia Business School with t appropriate title: Corporate raiding -- The Art Of War (Fo tune August 17, 1987, page 92). How to fight the raiders an keep them at bay, is told by Donald J Gogel, managing direc tor in the mergers and acquisitions department of Kidder, Pea body and Company, New York. Gogel tells us (CORPO RATE RESTRUCTURING -- MANAGEMENT FIGHT THE RAIDERS, Management Review, July 1987, pages 28 34) that if capable managements can create shareholder valu through proper structuring, they can out-manoeuver the raid ers in this game. In fact the resources, of capital and exper tise that raiders use, in the hands of a good management ca achieve wonders with the help and wisdom of merchant bank ers who can look at the long term good of all the parties con cerned. In contrast, a raider is a 'short-termer' who is ou to make a 'fast buck' for himself. In both cases, the magi word is 'restructuring, the only difference is whether it i brought about by a raider to achieve his personal goal in th short term, or by a management keenly interested in the lon term good of employees, customers and shareholders. A poo management, through its poor strategies, leads the share price to a level much below its potential -- a level which attract the raiders in the first place. Ultimately, the company may be led to a stage when it is 'worth more dead than alive' and this is precisely the stage a raider is waiting for before moving in with his strategy. And once successful, some of the units are sold off to realise a price higher than his cost of taking over the entire company -- a short term strategy which brings the raiders enormous dividends, but leaving the company far poorer than before. Managers of the company concerned can either watch the process passively, do nothing about it and in the process lose their jobs, or be alert to the situation and take appropriate action to repel the raider. How? They can evolve new strategies, including mergers, acquisitions, divestitures and recapitalisation, leading to better utilisation of its assets. This can be done in a deliberate and controlled manner, leading to an orderly transition, and ultimately this is reflected in much higher share price. After all the managers, by virtue of their know-how and experience, know far more about the business than the raider does!

Dr. Kharbanda, a Fellow of the Institution of Chemical Engineers, is a visiting professor and an author of repute. His latest title: CAPITAL COST ESTIMATING FOR THE PROCESS INDUSTRIES with E.A. Stallworthy (Butterworth end-1988)

Henkel-TPL tie-up to make detergents

Henkel of West Germany, the European giant in detergent manufacture, and Tamil Nadu Petro Products Limited (TPL), are joining hands to promoting a Rs. 30 crore project for making detergent powder and cakes without using the conventional raw material, sodium tri-polyphosphate (STPP).

The collaborative venture, to come up in the Karaikal-Narimanam belt will make the detergent with zeolite made from sodium silicate, a technology being brought for the first time in India. Abroad, zeolite-based detergent with carboxy methyl cellulose as additives is extremely popular because of its high quality. In Europe, the use of STPP is banned, it being a source of pollutant. A number of small and medium-sized units are coming up in Narimanam belt, for the manufacture of sodium silicate, which will ensure uninterrupted supplies of zeolite.

Henkel will have a financial stake in the venture. Plans are that TPL and Henkel will together put about Rs. 4 crores. Both International Finance Corporation (IFC) and the Asian Development Bank (ADB) are keen on participating in the venture by contributing to the equity. It is proposed to raise about Rs. 6 crores through a public issue. TPL and Henkel will promote a new company for implementing the project. The new company will enter the capital market early next year. Work on the project is scheduled to commence in July this year and is expected to go on stream in about 18 months. The project will use linear alkyl benzene (LAB) manufactured by it.

The plant will have a capacity of 30,000 tonnes per year. Fifty per cent of it will be in the form of powder and the balance in the form of cakes. All the benefits of notified "A" backward area will accrue to the project.

A significant feature of the project is that Henkel, apart from agreeing to buy-back a part of the output, will also make available its marketing expertise. There are also export possibilities. The turnover of the new company, one year after the project goes on stream, is expected to be around Rs. 50 crores.

Henkel ranks number three in the world after Levers and Proctor and Gamble and this is the first time the West German company has chosen to collaborate with a foreign party. It is a closely held company, enjoying a high reputation for its products.

IMPORT OF ENZYME

Import of enzyme used for conversion of penicillin 'V' into 6-APA has been placed under list of restricted items. A public notice issued by the office of the Chief Controller of Imports and Exports said that it had been added to appendix 2 part B as item serial number 48-a.

MANGALORE PETROCHEM PROJECT NOT TO BE SHELVED

Petroleum and natural gas minister Mr. Brahm Dutt told in the Lok Sabha that the Mangalore petrochemicals project would not be "killed". Replying to supplementaries during question hour, he said the detailed project report in this connection was now being taken up with the government, the Planning Commission and the Industries Ministry.

Already a sum of Rs. 30 crores had been allocated for creation of infrastructure for the project which had been decided to be put up in the joint sector, he added. The minister said he stood by his commitment that the 3-million tonnes grassroots complex would be put up. Mr. Veerendra Patil wanted an assurance that the project which was conceived in the Sixth Plan would not be killed on the plea that it was uneconomical after deliberately delinking the refinery from the petrochemical complex.

Group to help protect ozone layer

Delegates from 80 countries have agreed to set up a working group to consider ways of helping developing countries to phase out the chemicals that damage the earth's protective ozone layer. The agreement was reached on May 6, at the end of a week-long conference sponsored by the United Nations Environment Programme (UNEP) in Helsinki, Finland. The conference was the first follow-up meeting of the countries that signed the 1987 Montreal protocol of ozone-depleting chemicals called chlorofluorocarbons. It was attended by the 46 signatories of the protocol and other UNEP members. The working group, which any country may join, will report its findings at a conference to be held in London next year to review the Montreal protocol.

The Helsinki meeting also left open the possibility of establishing an international climate to help Third World countries develop the technology necessary to produce alternatives to chlorofluorocarbons (CFC's) without hindering their economic development.

Several industrialised countries expressed reservations on such a global fund. They said it could be expensive to set up and administer, and that they would prefer to deal with the matter through bilateral aid.

Environmental protection agency mooted

The European Community Environment Ministers have considered creating an environment protection agency and for the first time discussed the need for a global strategy to combat desertification. The debate on May 6, on desertification covered not only soil erosion, a problem of the entire Mediterranean region, but also deforestation. The EEC commissioner, Mr. Carlos Ripa di Meana, outlined the goals of a future EEC environmental protection agency and proposed the gathering of statistical information on: polluted air, water resources, quality and pollution, the state of the soil, vegetation and other resources

CO_2 POSES SERIOUS THREAT TO LITTORAL STATES

The phenomenal increase of carbon-dioxide in the atmosphere particularly in developing countries is likely to pose a great threat to the existence of some littoral states. Air and sea water are getting heated following the increase of carbon dioxide. A time may come when the water level of the sea bed will rise and submerse the coastal regions of Bangladesh, Maldives, and Lakshadweep Islands of India. This was cautioned by Dr. A.P. Mitra, director general of CSIR. Dr. Mitra, while del ering the 32nd Holland memorial le ture on " Global change: what In should do,", organised in Calcut recently by the Mining, Geological a Metallurgical Institute of India (MGM said that steps should be taken imme iately to reduce the carbon dioxide rati

Reckless coal mining and deforest tion should be stopped, and afforestra tion programmes should be taken up i the interest of maintaining equilibriu in nature. He said that CSIR was a present undertaking extensive researc on the atmosphere in an organise manner with the help of sophisticate devices.

In his presidential address, Mr. A.K Gosh, president of MGMI said that the current fragmentation of research efforts in Indian mineral industry, disparate control of funding agencies, lack of in-house research by industry itself and lack of long-term technology goals and perspectives had contributed to the adhocism in R & D activities. The absence of any long-term basic research work was a serious omission which needs to be redressed urgently. Apart, from this lack of any developmental research in the manufacturing sector for mining machinery was also glaring. Therefore, major institutional changes in the overall R & D framework was also called for.

FOR YOUR IMPORTS
AT COMPETITIVE CIF PRICES

For Competitive Imports of Chemicals, Pharmaceutical
Raw Materials and Particularly for the Following Items

Hydrogen Peroxide
Dimethyl Sulphoxide
Isopropyl Alcohol
Acetone
Methyl Iso Thiocyanate
Caustic Soda Flakes
Cyanuric Chloride
Propylene Glycol Tech/Indl.
TDI
Polyol
Benzaldehyde FFC
Triethylamine
Epichlorohydrine
Bisphenol A
Morpholine
Dioctyl Phthalate
Phthalic Anhydride
Maleic Anhydride
Perchloroethylene
Mono Chloro Acetic Acid
Trichloro Ethylene
Glycerine
Mercury virgin
Aniline Oil
Soda Ash
Oxalic Acid
Magnesium Oxide
L-Lysine Monohydrochloride
DL-Methionine
And Other Amino Acids

Please contact for further details:

S. AMIT & CO.

A TRUSTED NAME FOR IMPORT OF YOUR CHEMICALS
105, Neelam Centre, "A" Wing, Hind Cycle Road,
Worli, Bombay 400 025
Phones: 4934627-28/4933310 **Telex: 011-76877 CMIT IN**
Cable: "DULICTOL" **Fax No. 22-494950-4**

Madras Office: Queens Court, 134, Montieth Road, Madras-600 008.
Phones: 860172/866942
Hyderabad Office: 8-3-215/7 (First Floor), Srinivasa Nagar Colony (West),
HYDERABAD-500 890.
Phone: 35110

Our Associates: M/s. CHEM AMIT

MINING INDUSTRY

Statutory body for environment study

A statutory body will soon be constituted to check environmental damage and land subsidence caused by open cast mining in the Durgapur-Asansol coal mines area, an all-party delegation from West Bengal was assured at New Delhi recently.

Mr. Benoy Krishna Chowdhury, West Bengal minister of land and land reforms, who led the delegation and presented a memorandum to Union energy minister Mr. Vasanth Sathe, said that Mr. Sathe assured them that the body will have a well-defined role to plan and oversee the implementation of the remedial and preventive measures.

Subsidence caused by a network of tunnels and shafts in the coal seams, abandoned without proper sandstowing and other safety measures, has affected more than two lakh people in an area of about 4,555 hectare in the Ranigunj coalfields, Mr. Chowdhury said.

He said at least 44 locations are subsidence-prone and of these Ranigunj, Barar and Jamoria are densely populated, requiring immediate action.

The dangerous impact of subsidence can be gauged from the fact that in Ranigunj town itself the population density is 41.1 per acre, Mr. Chowdhury said, adding railway tracks are also being threatened due to unstable workings.

He said West Bengal chief minister Jyoti Basu, had in a letter to the Prime Minister recently suggested prohibition of open cast mining in locations having built-in-areas and agricultural lands.

The chief minister had sought guidelines requiring the Eastern Coalfields Ltd. to repair the environmental damage and restore the damaged land to their original form. Mr. Chowdhury said a pilot project devised by the Asansol-Durgapur development authority to stabilise the unstable areas had proved effective at Ramjibanpur colliery and the technique was successfully applied in some unstable areas of Jharia coalfields.

He said the total cost of application of this method for Ranigunj township is estimated to be about Rs. 25 crores, and the cost might be Rs. 200 crores for the entire Ranigunj coalfields area. Mr. Chowdhury said the state government has been urging the Centre to take immediate steps for mobilising the required resources and draw up an action plan for preventing subsidence and repairing damage already done.

He said the Centre overlooked the main issue of chalking out an action plan after resource mobilisation to control subsidence. Mr. Chowdhury said under the provisions of the Mines and Minerals (Regulation and Development) Act, 1957, it shall be the duty of the Central government to take all such steps as may be necessary for the protection of environment by preventing or controlling any pollution which may be caused by prospecting or mining operations.

He said the ECL is under legal obligation to ensure that no injury is caused to the environment in the area under lease with them. Mr. Chowdhury alleged that subsidence occurred due to the failure of various agencies to effectively implement the legal provisions. The delegation expressed the hope that the Centre would take prompt action to remedy the damage caused to the ecosystem by unscientific mining.

ONE-THIRD OF BOMBAY MAY BE SUBMERGED IN 3 OR 4 DECADES

More than one-third of Bombay city will be submerged under sea water in the next three to four decades, according to city environmentalists. Thi because of the rise in sea level cau by melting of ice at the polar cap

Referring to various studies made "World climate changes", Dr. Ras Mayur, head of the Urban Developm Authority said, all environme changes were "man-made and cau by rapid technological progress. T was contrary to the general belief t all these changes were due to the tra formation in earth's climate and atm phere over the past several years".

He pointed out that the accumulati of carbon dioxide in the atmosphere d to massive use of fossil fuels h resulted in raising the earth's temp ature by 1.5 to 2 degrees Centigrade the last 75 years. This phenomen would, increase temperatures on ear by 2 to 3 degrees by 2030 AD when t level of carbon dioxide was expected touch 450 parts per million (PPM against the present level of 370 PPM

Moreover, Dr. Mayur said, the ci had became warmer than other plac due to the large amount of heat collect in cement and concrete structures an reduction in greenery. The rise in tem perature at the lower atmospheric leve otherwise called the "Greenhou effect", caused changes in rainfall an wind patterns, he said. This would cau continuous flooding in the eastern par of the country.

FIEO PLEA TO DEFINE EXPOR PROFITS

The Federation of Indian Expo Organisations (FIEO) has urged th Government to clearly define expo profits, according to a FIEO releas issued at New Delhi recently. Whi hailing the Government's achievemen on export performance, the President o FIEO, Mr. Ramu S. Deora, said th Government should define export pro fits distinctly after including CCS, dut drawback, Rep licences and MDA i the same.

High-level drug team for USSR

A high-level delegation led by the ecretary, Department of Chemicals nd Petrochemicals, is visiting the oviet Union to explore the possibilities f setting up more joint ventures in rugs and pharmaceuticals.

The team's visit coincides with a joint eminar-cum-exhibition on the state of he drug industry in the two countries. The visit will be utilised to identify gaps n the production of drugs in each coun-ry and negotiate technology transfers.

It is hoped that the talks may result n taking the Indo-Soviet drug trade urnover from the present Rs. 350 rores to Rs. 500 crores in the next two ears and Rs. 1,000 crores in the next ew years.

The joint ventures may be set up in ndia, the Soviet Union and in third world countries. Many joint ventures are lready being considered. Recently Unichem Ltd., concluded a contract with Phimkenbiofarm of the USSR to manufacture buprenorphine and maxi-an at Chimkent.

Addressing a news conference at New Delhi recently, the President of the ndo-USSR Chamber of Commerce and ndustry, Mr. Manubhai Shah, said the rade was bound to get a boost as a esult of the visit of the delegation as lready the country was exporting a lot f formulations, veterinary drugs and ther pharmaceuticals to the Soviet nion.

In some technologies, India was on ie high road and could establish joint entures to make some drugs in the SSR, he said. He said that the Soviet nion was also keen on ayurvedic rugs. India is world leader in the man-facture of herbal, ayurvedic, Tibetan nd homoeopathic drugs. Some of these ould be negotiated at the seminar.

In the field of technology, the Indian rugs and Pharmaceuticals Ltd. (IDPL) and HAL, the two public sector companies, have already discussed possibilities of providing knowhow to the Soviets. The scope for signing a memorandum of understanding (MoU) by the two countries in these areas is also very encouraging, according to official sources.

In fact, IDPL was originally set up with Soviet technology. The Indian drugs' industry, however, has developed by leaps and bounds reaching a level of sophistication which has surprised even the Soviets. Today, the very same Indian Drugs and Pharmaceutical industry is in a position to offer technology in some fields to the Soviets.

He said for the first time such a high-level delegation was visiting the Soviet Union. Among other members of the 54-member team headed by Mr. M.S. Gill are Joint Secretary, Department of Chemicals and Petrochemicals, Mr. R.S. Matur, the Director-General, Technical Development, Mr. K.D. Sharma, the Director, Ministry of Commerce, Mr. A. Chaturvedi and the Deputy Drug Controller, Mr. P. Dasgupta. The Indian delegation will also explore possibilities of exporting, in a big way, pesticides to the USSR. In fact, some of the companies whose representatives are accompanying Mr. Gill are confident of doing business worth Rs. 100 crores in a matter of three years with the Soviets in this area.

EXPORTERS HAIL RELIEFS ON PASS-BOOK SCHEME

The Federation of Indian Export Organisation (FIEO) has welcomed the govt. efforts for augmenting supplies of critical raw-materials and other inputs required by exporters for export production on a duty free basis. In this connection the FIEO President, Mr. Ramu S. Deora, has hailed that the facilities of intermediate advance licensing scheme have been extended to holders of pass-book under the pass book scheme.

BICP may fix drug packaging charges

The Bureau of Industrial Costs and Prices (BICP) is considering fixing of pharmaceutical packaging charges as distinct from norms, a move which could delay the implementation of the new drug packaging and conversion norms.

Many companies have applied for price revision based on the new norms which were to be implemented with effect from April 1. The Government has not yet approved of any price revision based on the new norms.

Drug companies now submit their actual packaging charges which in theory are reimbursible, other costs like processing charges being subject to fixed norms. In actual practice, however, BICP used to disallow/approve of these charges based on internal guidelines which were not officially notified. The new thinking is that once they are fixed and communicated to the industry, the latter will know what price will be allowed for what sizes of vials, bottles and the like.

There is also a feeling that the move is yet another ploy to delay the implementation of the new norms. In any case, it does not appear to be rational considering the fact that packaging materials are priced differently in various parts of the country. As packaging materials are not price-controlled, BICP has to revise its list at least every six months if it is to have any meaning.

Some companies have mooted an automatic adjustment of prices based indexation as an alternative. This will involve computation of prices of major packaging materials and utilities, leading to periodic adjustments like in the case of dearness adjustments.

Automatic adjustments will also ease the burden of BICP in its task of scrutinising and approving price applications numbering more than 15,000. The industry's experience is that BICP c process, on an average, 300 applicatio a month. However, the Government yet to agree to the concept of autom tic price adjustment. Conversion norm consist of three components: cost conversion of drugs into formulation packaging and process losses. The ne norms have raised conversion and pack aging charges by about 50% over thos fixed under the earlier norms of 197 However, process loss allowance ha been reduced by an average four pe cent.

Some units producing high valu drugs like antibiotics and steroids have discovered that reduced process loss allowed in the new notification will more than offset the marginal gain from the increased conversion and packing charges now available. If these units go for the new norms, the net price for their high value products will, ironically, be reduced. Naturally, these units are unlikely to seek price revision based on the new norms.

Star Chemicals

OFFERING FOR YOUR DIRECT IMPORT OF:

TAMA'S SUPER DRY

ASC

(N-Acetyl Sulphanilyl Chloride)

From World's Largest Producer

M/s. TAMA CHEMICALS, JAPAN

in Association with

M/s. MITSUI & CO. LTD. JAPAN

And for other Chemicals, Pharmaceuticals & Intermediates

PLEASE CONTACT WITH YOUR SPECIFIC REQUIREMENTS

MADRAS OFFICE :
D-4, 2/36 RAMS SQUARE
2, Village Road
MADRAS 600 034
Tel : 864430
Tlx : 041 7764 STAR IN

HYDERABAD OFFICE :
'NALANDA' Unit No. 7
6-3-649, Somajiguda
Hyderabad 500 482
Tel : 220066 Ext. 26

OUR LOCATION DOES NOT MAKE ANY DIFFERENCE TO OUR COMMITMENT TO SERVE YOU

AMPICIN, IBUPROFEN

Price cut may be restored by 50%

he government may hike the prices wo vital bulk drugs namely rifam- n and ibuprofen by about 50%, it is nt. The new price for rifampicin will Rs. 3409 a kg. and ibuprofen price be Rs. 650 a kg. The Bureau of ustrial Costs and Pricing (BICP) is erstood to have recommended the prices on the basis of fresh cost . The new prices are expected to be ounced shortly.

Only six months ago, the government cut the price of rifampicin, a widely d anti-T.B. drug in the country to 2500 a kg. from Rs. 3000. Almost ne same time the price of ibuprofen also cut to Rs. 400 from Rs. 810 g. The price reduction on both the gs was considered arbitrary and ealistic by the drug units and a nber of representations have been le by the drug units against the price . The Department of Chemicals and rochemicals had subsequently asked BICP to investigate the actual costs roduction of both drugs and recom- nd new prices. According to rmed sources, the price cut on mpicin was effected on the assump- that prices of the drug had fallen ne world market. Indian Drugs and rmaceuticals Ltd. had imported e quantity of rifampicin at a price Rs. 2500 a kg. early last year.

n fact rifampicin imported from na was hardly touched by drug units ing rifampicin formulations as the ity of the Chinese material was con- red to be very inferior. The bulk sity of Chinese rifampicin was only whereas the standard bulk density fampicin should be 0.7. The reduc- of rifampicin price badly hit the nulations as it meant a correspond- reduction in the formulation prices . In fact the drug units have been ng for an upward revision of rifam- n price from the level of Rs. 3000 n long time as there has been a general increase in the price of rifampicin worldwide.

The demand for rifampicin in the country was 120 tonnes last year which is almost 40% of total world consumption. The entire requirement of the country is being met by domestic units although their production is from the penultimate intermediate. In case of ibuprofen, the government reduced the price to Rs. 400 a kg. from Rs. 810 a kg. on the basis of cost data submitted by one small drug unit, the sources say. The Department of Chemicals and Petrochemicals is stated to have later convinced that the actual costs are much more than Rs. 400 a kg. Boots India is one of the largest manufacturers of ibuprofen and its formulations.

SENIOR PHARMA TO TIE - UP WITH KUWAITI CO. FOR EXPORTS

Senior Pharmaceuticals Ltd., is having discussions with the Al Awadi group in Kuwait for exporting proteolytic enzymes (used in post-surgical healing) to the West Asian market, according to the managing director, Mr. L.P. Rebello, and the joint managing director, Mr. L.N.K.Murthy. Briefing newsmen shortly after the commissioning of the company's manufacturing unit at Bommasandra, near Bangalore, Mr. Y.K. Puttasome Gowda, managing director, of Karnataka State Financial Corporation (KSFC), said that there was also a proposal for setting up a subsidiary company for promoting exports of other pharmaceutical products, including surgical needles. Investment by the Al Awadi group in setting up this subsidiary company was also mooted but discussions were still at a very preliminary stage, they added.

Mr. Rebello and Mr. Murthy stated that, with the manufacturing unit at Bommasandra becoming operational in three weeks, the turnover from sales in the domestic market was projected to increase from about Rs. 2 crores in 1988-89 (the first year of commercial operations when the company's products were being manufactured under loan licence in Bombay) to Rs. 2.4 crores in 1989-90, Rs. 3.8 crores in 1990-91 and Rs. 4.9 crores in 1991-92. The company's main product lines, they added, would comprise high-value items like antibiotics, nutritionals, anti-inflammatories, analgesics and surgical specialities. It was also intended to shortly get into speciality areas like anti-hypertensive, anti-cancer, anti-diabetic and cardiovascular drugs. The products would be manufactured under technical collaboration with the Dusseldorf-based West German company, Medice.

Mr. Rebello estimated the project cost of setting up the manufacturing unit at Rs 1.5 crores (plant and machinery Rs. 30 lakhs, and buildings Rs. 75 lakhs). This was financed through equity of Rs. 94 lakhs the share of the two main promoters - the NRI chairman, Dr. W.J.S. Menezes, and Mr. Rebello - being Rs. 55 lakhs, with the remaining Rs. 39 lakhs being invested both by NRIs and local investors and term-loans from KSFC of around Rs. 65 lakhs. "We came to Karnataka because of the incentives offered by the state government," he said.

CENTRE'S SCHEME FOR TANNERIES

Minister of State for Industrial Development Mr. Arunachalam informed the Lok Sabha that a new centrally-sponsored scheme has been introduced from 1989-90 for three years for assistance to states for setting up common effiuent treatment plants for clusters of tanneries. In a written reply the minister said the centre's assistance would be as a matching grant of 25% of the total project cost, corresponding to 25% contribution by the state government.

Loan licensing in drug industry extended

The government has decided to extend the system of loan licensing in drug industry up to 1994, it is learnt. The earlier proposal was to phase out the system of licensing in drug industry by 1990.

An amendment to drugs and cosmetics rules 1945 omitting all provisions relating to loan licensing has been proposed by the Union Ministry of Health and Family Planning some time in 1987.

The decision to discontinue the 32-year old system is pursuant to the objectives of the new drug policy announced in December 1986.

The proposal to phase out loan licensing by 1990 in the drug industry attracted severe opposition from all sectors of the drug industry on the fear that it would seriously affect drug production in general.

The government had then appointed a special committee to go into the issue of loan licence manufacture in the drug industry. And its move now to extend the system of loan licensing is based on the recommendation of this committee, informed sources say.

The loan licences are issued by the food and drug administrations of various states normally for a period of two years and renewed thereafter at the discretion of the respective FDAs. One of the conditions which FDAs are supposed to monitor after issuing loan licenses is that the licencee should set up his own manufacturing facility within two years. Quite often FDAs fail to monitor this provision and licences are invariably renewed.

The Union health ministry has been considering the idea of abolition of loan licensing in the drug industry for long in the context of the general impression that the system is responsible for generation of spurious and sub-standard drugs and medicines.

The number of loan licencee in the drug industry is estimated at about 10,000 at present. And out of that as many as 6,000 are located in Maharashtra and Gujarat alone.

WIND ENERGY CENTRE TO BE SET UP AT NAL

A wind energy centre will be established at the National Aeronautical Laboratory in Bangalore with the assistance of the United Nations Development Programme (UNDP).

The Union Finance Ministry recently cleared the project which will receive $1.2 million from UNDP over a year period. The Department of Conventional Energy Sources implement the project to strengthe country's capabilities in designin testing innovative wind energy dev

The United Nations Departmen Technical Co-operaton for Deve ment in New York has been design the executing agency.

The centre when established serve as a focal point for harnessing utilising wind energy as an alterna source of energy.

Broad estimates of the wind ene potential have indicated a total resou base of more than 50,000 mw of wh at least 20,000 mw is conside exploitable.

The increasing demand for energ the rapid depletion of conventio sources of energy and their increasi production costs have led the Gover ment to attach high priority to the dev opment of non-conventional ener sources such as solar, wind and bioma

The country which has gained suf cient experience in a wide range of wi technologies during the Sixth and Se enth Plans, is now planning for a lar wind energy programme during t Eighth Plan.

Ranbaxy to venture into biochemicals

anbaxy Laboratories, which is a r in bulk antibiotic drugs and for- tions, has decided to venture for- l in the field of biochemical, bacterial drugs and vitamins. The pany is investing around Rs. 4 es annually in R & D and has loped new drugs like norfloxacin, idine, an anti-ulcer drug which is world's largest selling, perloxacin efloxin. The last two drugs are g totally exported at present. Inquir- rom China and Russia have also received for these drugs.

he company has also developed an iinfective drug, ciprofloxicin, which substitute for antibiotics. It is ently being exported to Europe, a and Japan. The Indian govern- 's approval for marketing the drug ne country is also likely to be ved this month. The company's drug plant at Toansa in Hoshiar- istrict of Punjab has been approved e Food and Drugs Administration e U.S.A., which has led to the open- f new export vistas in the world's st pharmaceutical market. With its t breakthrough based on its own ology, the company has earned a among the world's technologically nced pharmaceutical companies.

rt targets

ith exports at over 50 per cent of al production of bulk drugs, it has d foreign exchange to the tune of 4 crores in the 15 month period l March 31, 1989, against 8.33 crores in 1987. The company owever, set a still higher export of Rs. 40 crores for the current ending March 31, 1990, which it ts to exceed in view of the buoyant nd for its products in overseas cts.

anwhile, the company has made progress in its Rs. 17 crore expan- and diversification programme. omputerisation of its manufactur- cilities and outlets have become tional, thus optimising its opera- The on-going capital expenditure on the research centre has also been fully utilised. The expansion of the surgical dressings and bandage unit at Dewas in M.P. has become fully operational.

The first phase of the expansion of the clinical diagnostics unit at Okhla, New Delhi, has gone on stream and the second phase is expected to be completed by December 1989. The basic drugs plant for the new bulk drugs unit at Shaibzada Ajit Singh Nagar has also gone on stream.

In the 15 month period ended March 31, 1989, the company has achieved sales of Rs. 179 crores against Rs. 112 crores in 1987, thus recording a growth of 32 per cent on an annualised basis. The company has also shown a commensurate increase in its profitability. With large investments in 1988-89, the depreciation charge is expected to be substantially higher, taxation rates much lower and net profits higher. The company has already paid an interim dividend of 15 per cent for 1988-89 and is likely to recommend a reasonable final equity dividend when the accounts for the 15 month period are finalised.

PHARMACEUTICAL PRODUCTS TO ENTER CAPITAL MARKET

The Pharmaceutical Products of India Ltd. (PPIL), an existing profitmaking company, engaged in manufacturing essential drugs, will enter the capital market on May 31, with an issue of Rs. 65 lakhs to part finance its Rs. 156 lakh expansion programme and to meet the needs of longterm working capital. The company, promoted by Mr. M.K. Rayana and his associates is engaged in the manufacture of essential drugs under loan licence. The company is setting up a modern bulk drug unit with multipurpose plant and machinery and a formulation unit in the MIDC industrial area at Tarapur in Maharashtra. Out of the public issue of Rs. 65 lakhs, UTI has taken one lakh shares on a firm allotment basis.

RCF to set up methylamine plant

Rashtriya Chemicals and Fertilisers Ltd. (RCF) is setting up a Rs. 12.75-crore methylamine plant at its Thal complex in Raigad district.

According to an RCF statement, an agreement for doing detailed engineering was signed by Mr. R. Venkatesan, Chairman and Managing Director RCF with Project Development India Ltd.

The plant will have an annual capacity of producing 5,000 tonnes and will have a foreign exchange component of Rs. 1.92 crores. RCF expects the entire capital cost to be paid back in four years.

The know-how for the plant is being supplied by Acid Amine Technology of the US. It will produce mono, di and tri methylamines.

The raw materials, methanol and ammonia, are produced by RCF. Dimethylamine will be used in the manufacture of dimethyl formamide at RCF's Trombay plant.

Methylamines are extensively used in pesticides, drugs and pharmaceuticals, rubber industry, ion exchange, space research and the like. The plant is expected to be completed within two years.

Chambal Fertilisers on schedule

The Rs. 764-crore giant gas-based fertiliser project in Rajasthan of Chambal Fertilisers and Chemicals will be commissioned very soon. The work on the construction of the fully automated fertiliser plant along with infrastructural facilities has begun at Gadepan, near Kota. The plant will have an installed capacity of 4.45 lakh tonnes of ammonia and 7.42 lakh tonnes of urea per annum.

The company is promoted by Goa-based Zuari Agro Chemicals. The State Government has already allotted land which will be handed over to the company by mid-May. The urea technology has been provided by Snamprogetti of Italy and ammonia technology by Halder Topsoe. The offsite facilities will be constructed by Toyo Engineering India.

The Industrial Development Bank of India (IDBI) has appraised the project and approved the financing by way of share capital of Rs. 152.8 crores and term loan of Rs. 611.2 crores.

The project implementation is scheduled to commence by May 20 and is scheduled to be completed within 36 months. However, the company is confident of commissioning it ahead of schedule.

SEMINAR ON INDUSTRIAL P LUTION CONTROL

The Centre for Environm Science and Engineering (CESE), an Institute of Technology, Bomb organising a two day seminar on I strial Pollution Control schedule June 8-9, 1989 at IIT campus, Bom

The seminar in commemoratio the Nehru Centenary Year is co-spo red by industry. The seminar will f attention on the diverse and com nature of the industrial wastewaters atmospheric emissions requiring n modified processes, technology equipment for their treatment. Pa will be presented by senior executi representing equipment manufactu and industries engaged in the prod tion of fertilisers, cement, paper, a hol (distillery), petroleum-crude dril and refining, petrochemical, chemi and allied products and operations. seminar will be of interest to pers from the process industries, consulta equipment suppliers, regulatory age es and other institutions/organisatio

Registration fee is Rs. 800 per d egate payable by cheque/draft in fav of Registrar, IIT Bombay. The name delegates, fees and all communicati can be sent to: Prof. H. Veerama Seminar Convener, Centre For Envir mental Science and Engineering, I Powai, Bombay-400 076.

JK's glyphosate project approved

Two major projects of the JK group volving a total investment of Rs. 385 khs have been approved by the Centre. nkleshwar in Gujarat and Kota in Rajsthan are the sites for the plants. The ujarat unit will manufacture glyphoate and its formulations with a capacy of 100 tpa while the Rajasthan enture is for enlarging in-house facilies to render technical services to cusomers both in India and abroad for utting up projects.

The Gujarat projects cost is Rs. 85 akhs, which will be met through inter-al accruals (Rs. 17 lakhs), state subidy (Rs. 7 lakhs), and rupee loans from Is (Rs. 61 lakhs). This project will be mplemented by JKBM Limited based n wholly indigenous technology. Sco-e for the proposed project is there since t present there is only one manufacturer aving a licensed capacity of 100 tpa nd an installed capacity of 60 tpa.

As per conditions of the govt., the ompany will manufacture glyphosate rom the basic stage i.e. from glycine. Necessary pollution control measures will have to be taken by the company o the satisfaction of both the state govmment and other Central authorities.

Of the Rs. 300 lakh cost of its Kota enture to be executed by Jay-Kay Tech ervices, a division of JK Synthetics imited, internal accruals will amount o Rs. 165 lakhs and the balance of s. 135 lakhs will be from banks other han FIs, deferred credit/suppliers credit.

The new venture's goals are: to utiise effectively their qualified and experenced manpower resources for endering technical services for turnkey rojects, project management, design, letailed engineering and lay-out, erecion and commissioning, feasibility eports etc. in respect of various projects ncluding chemicals, fertiliser and petrochemical industries. The company has lso entered into foreign collaboration with SNC/FW Limited subject to final pproval by the government and its varous authorities. One of the terms of the greement is that during the term of the pact with the JK group the foreign collaborator "shall not enter into a similar agreement with other consulting and engineering companies in India for chemical, petrochemical, fertiliser, petroleum and gas processing industries".

Meanwhile the government has also okayed JK Synthetics' proposal for broadbanding its manufacturing activity at Kota. It has sought and got approved, changes in its license to cover the manufacture of synthetic filament yarn including industrial yarn and tyre cord. The present capacity of its Kota project is 15,000 tpa of nylon filament yarn. As is the usual practice the government has told the company that it shall not invest additional funds either on plan or machinery and building under the broadbanding scheme.

PET CERTIFIED FOR PACKING INSECTICIDES

The Central Insecticides Board has certified the use of containers made of PET (polyethylene terephthalate), a plastic material, for packing insecticides, it is learnt. Following the board's certification, leading companies like National Organic Chemical Industries Ltd. (NOCIL) and Cyanamid are studying the feasibility of using PET bottles for insecticides, it is understood.

PET, which dominates the world bottle scene, has been growing at a fast pace in India ever since its introduction. It has not only annexed the market hitherto enjoyed by glass, but has eaten into the bottle market enjoyed by other plastics like high density polyethylene. Its main advantage over other plastics is its glasslike transparency. Producers of cooking oils now prefer PET bottles. It can also be moulded to ornamental shapes.

A major area where PET can replace glass is the soft drink market. In China 90% of Pepsico's soft drink is bottled in PET. It is very probable the Pepsico, which is expected to hit the Indian market by March 1990, will be packed in PET bottles.

FERTILISER PRICING NORMS

Planning Commission to review policy

The Planning Commission is veering round to the view that the proposed changes in the fertiliser pricing norms are a bit too harsh and that these should be diluted to keep the industry healthy.

The commission is studying the representations made in this regard by the Fertiliser Association of India and the Indo-Gulf Fertilisers and Chemicals Corporation who have pointed out that in case the depreciation period is changed from 10 years to 20 years, the cash flow would be so low that any new fertiliser unit would go sick from the word go. The Commission says that the changes in the pricing norms should be such as not to make the industry sick. Moreover, it wants the scarce resources of the country to be put to optimal use. The commission is learnt to be in favour of keeping the depreciation period around 15 years and the capacity utilisation norm to be around 85% for 12% post-tax return.

It was earlier proposed to spread the depreciation period over a longer period of 20 years instead of the earlier ten years. It was also proposed to have a sliding capacity utilisation norm for the gas-based fertiliser units. For the first year, it was proposed toallow the units to have a 12% post-tax return on net worth at 80% capacity utilisation. From second to tenth year of their operation, the units were proposed to be allowed a 12% post-tax return on net worth at 90% capacity utilisation, and from eleventh year onwards, the same return at 85% capacity utilisation.

The government had hoped to save Rs. 230 crores on fertiliser subsidy in a full year by these two measures -- Rs. 100 crores from the change in the capacity utilisation norm and Rs. 130 crores from the change in the depreciation period.

The industry reacted to the changes by saying that these would not only affect the producers but also the le ing institutions. It said that new g based units, particularly those in the p vate sector with a debt-equity ratio 4:1, will not be able to repay their lo as the cash generation from the reduc depreciation would not cover even h their annual repayment obligations.

The proposed change to reimbu depreciation cost on the basis of years life time of assets effective means reducing the allownace fr 10.5% on plant and machinery to on 5% and that too on the historic and n replacement cost. Industry sources s that as it was, the earlier provision price fixation was grossly inadequate relation to the need for accelerated d preciation to cope with increasing inc dence of inflation and technologic obsolescence, and reducing this furth to 5% would almost completely starv the units of funds to carry out even th minimum replacement of plant an machinery, let alone generation of ad quate funds to support growth, mode nisation and technological upgradatio

4 MT rise likely in fertiliser demand

The total demand for fertilisers in ms of nutrients is expected to be -16.5 million tonnes by the end of the ghth Plan as against 12.5 million nes during the terminal year of the venth Plan. This has been predicted a sub-group of the working group on tilisers set up by the Planning Com-ssion. The sub-group has made mand projections for the Eighth Plan d beyond.

It has estimated the fertiliser demand terms of nutrients at 20-20.6 million nes by the end of the Ninth Plan and .9-24.6 million tonnes by the terminal ar of the Tenth Plan. The group has d that the industry has a vital role in hieving these targets. "The fertiliser cing policy should have provisions adequate support to fertiliser indus-to enable it to achieve the targets".

The group has noted targets of ferti-er consumption of 13.5-14 million nes of nutrients approved by the anning Commission for achieving the od production target of 178-183 mil-n tonnes by 1989-90 and also the re-ed targets of 12.3-12.5 million tonnes nutrients for the revised foodgrain oduction target of 173-175 million nes by the end of the Seventh Plan.

It says that the deceleration in con-mption growth during the first three ars of the Seventh Plan notwithstand-, the revised targets of 12.3-12.5 mil-n tonnes for 1989-90 seem to be quite listic, especially in the background a landmark achievement during 88-89, which is expected to have led with more than two million ton-increase in consumption in a single r. This also indicates the unexploited ential which can be realised during next plan periods.

The base year consumption for 89-90 has, therefore, been adopted by group as 12.5 million tonnes of rients for 1989-90 with a break-up 7.9 million tonnes of N, 3.40 million tonnes of P_2O_5 and 1.2 million tonnes of K_2O. On consumer prices of fertilisers, the group agrees to the recommendations made by the G.V.K. Rao Committee. It has said that there should be a marginal increase in fertiliser prices to the level of 5 to 10 per cent if the cumulative consumption growth is more than 30% in the preceeding three years.

It also has said that an optimum cost-benefit ratio should be maintained to induce the farmers to fertiliser use. The output-input ratio should also be kept at the optimum level. The group has noted with concern the declining soil fertility and the role of micronutrients as critical input in increasing crop productions. It has, therefore, recommended that concerted efforts should be made to ensure judicious and balanced use of fertilisers through expansion of soil testing facilities, intensification of extension strategy for demonstration of new crop production technology to farmers and integrated use of chemical fertilisers with organic manure and bio-fertilisers.

The group has recommended that a national project should be prepared for effective use of all available organic manures, rural and urban compost and biogas slurry through latest technology and enrichment.

A national project should also be prepared for promoting need-based use of micronutrients and soil amendments like gypsum and pyrites in alkali soils and lime in acid soils of the country and also the preferred use of single super phosphate (SSP) in pulses and oil seeds. Efforts should also be made to promote the existing technology for increasing fertiliser use efficiency.

To ensure the quality and adequate availability of zinc sulphate, it should be dereserved from the small-scale sector so that its production could be undertaken by the medium and large public institutions.

Synthetics and Chemicals to raise capacity

Synthetics and Chemicals Ltd., India's largest producer of synthetic rubber is entering the market with an issue of 18.36 lakhs -- it shall be of 12.5 per cent partly convertible debentures of Rs. 100 each. Out of this, 17.47 lakh debentures will be issued to the company's shareholders on a rights basis and 0.87 lakhs to the company's employees.

The convertible portion of Rs. 40 will be converted into two equity shares of Rs. 10 each at a premium of Rs. 10 per share on January 1, 1990. The non-convertible portion of Rs. 60 will be redeemed in three instalments of Rs. 20 each after six, seven and eight years respectively. The issue, which is opening on May 15 is for part-financing the expansion programme of the company.

The expansion programme involves enhancement of production capacity from 30,000 to 80,000 tpa of Styrene Butadiene Rubber (SBR), 60,000 tpa of Styrene, 40,000 tpa of Polystyrene and 60 million litres of ethyl alcohol. Having completed 25 years of production, Synthetics and Chemicals Ltd. is the only producer of Styrene Butadiene Rubber (SBR). It is also a profit-making and dividend-paying company.

Mr. Sanjay S. Kilachand, Executive Director, told newsmen that the company had made all-round progress since 1984. Its sales had crossed the Rs. 100 crore mark and this year the figure was almost touching Rs. 125 crores. Profitability too had increased manifold. Dividend, which was 8 per cent in 1984 increased to 21 per cent last year. The debt/equity ratio had reached a healthy 16:1. The working results for 1988-89 placed the company in a sound financial position.

Synthetic rubber is used in the manufacture of auto tyres, cycle tyres, shoe soles, hawaii chappals, battery containers, beltings, brakeliners, gaskets, oil-resistant seals etc. The tyre industry consumes almost 50 per cent of all rubber produced. Last year the tyre industry's consumption of rubber grew by 18 per cent. This increasing trend is expected to continue, assuring Synthetics and Chemicals Ltd. of a consistent market for its synthetic rubber, according to Mr. Kilachand.

Styrene Butadiene Rubber (SBR) accounts for about half of the world's usage of synthetic rubber and one-third of total world rubber usage (this includes natural rubber also). India is importing about 70,000 tonnes of synthetic rubber. So, there is no option but to rely on indigenous production of synthetic rubber in future also, not only to replace imports but also to meet the higher demand of rubber-using industries, according to Mr. Kilachand.

The present per capita consumption of synthetic rubber in India is a mere 0.1 kg against 8-10 kg for leading countries like the US and Japan and 2.7 kg for the world as a whole. As against this, the growth of rubber consumption in India is three times the world average.

PVC RAW MATERIAL CRUNCH DECRIED

The President of the All-India Federation of Plastic Industries, Mr. Virender Kumar, has said that shortage of essential constituents for PVC processing is having a crippling effect on the industry. In a news release issued at New Delhi recently, Mr. Kumar has said the availability of heavy normal paraffin (HNP) which is an essential input for chlorinated paraffin (COPN) has become critical since the fire at IPCL's plant in February this year.

The shortfall in availability of HNP has thrown the production of COPN out of gear, he has stated. Mr. Kumar has further stated that ad-hoc imports of HNP is the only alternative to sustain industry till IPCL begins production. He has, as such, urged the Government to take remedial measures with the least possible delay in the interest of the industry.

AROMATICS COMPLEX: CONSULTANCY SUB-CONTRACT FOR EIL

Engineers India Ltd. (EIL) will act as a sub-contractor-in-consultancy for Toyo of Japan which has bagged the consultancy contract for the preparation of a detailed project report (DPR) on the Rs. 840-crore aromatics complex at Manali on the outskirts of Madras.

The total value of the consultancy contract is of the order of Rs. 2.70 crores. Of this, EIL's sub-contract-in-consultancy may entail a fee of Rs. 1 crore or so, according to informed sources. The details of the consultancy contract will be worked out at discussions in Tokyo. The Chairman of National Aromatics and Petrochemical Corporation (NAPCO), Mr. V.R. Deenadayalu, is likely to participate in these discussions very soon. NAPCO is the joint venture company of the aromatics complex promoters namely Madras Refineries Ltd., and SPIC.

CHARGE ON PATALGANGA POLLUTION REFUTED

Mr. Ramesh Bakshi, Chairman of the Industries Association of Khopoli, has refuted the charge that the industrial units are polluting the water of Patalganga. Addressing the annual meeting of the Association, he said that the members were aware of their social obligations and the industrial units had installed water treatment plants.

The Association had agreed to pay Rs. 70 lakhs in response to the appeal by Mr. B.A. Desai, Minister of State for Environment & Industries, for laying down a pipeline in the area. Mr. B.M. Ghia, industrialist, presided over the meeting and Mr. P.G. Deshpande, Vice-Chairman, proposed a vote of thanks.

Modernisation of Indian Rare Earths plant

The Indian Rare Earths plant in Manavalakurichi in Kanyakumari district under the Department of Atomic Energy is implementing a Rs. 10 crore modernisation programme to improve mineral extraction, according to Mr. B. Govinda Pillai, general manager of the plant.

Under the first phase about Rs. 3 crores would be spent on the mineral concentrate upgrading plant (CUP) to increase the extraction of minerals like ilmenite, monosite, zircon and rutile from the mineral rich sands. At present due to continuous working there was depletion of the mineral concentration recovered from the sands. The work had already been taken up and would be completed by March next year, he said.

The plant itself was undergoing a modernisation programme costing Rs. 7 crores. The equipment now in use were 30 to 40 years old and their replacement would help not only in increasing the productivity but also in improving the quality of the minerals recovered from the sands. Only about 60 to 70 per cent of the minerals found in the sands were being recovered now and once the old equipment were replaced this would go up to even 90 per cent. The machinery were being purchased from countries, such as the U.S. and Australia.

Mr. Govinda Pillai said the replacement of the old machinery was expected to be completed by late next year or in early 1991. When this was achieved the annual production of zircon would be 10,000 tonnes and that of rutile 3,500 tonnes. At present their production levels are just 50 per cent of these figures.

Significant increase

There would be significant increase in respect of monosite (from 4,000 tonnes to 5,000 tonnes), ilmenite (from 70,000 tonnes to 90,000 tonnes) and garnet from (5,000 tonnes to 7,000 tonnes). Mining technology was also being improved and the minerals found under the water table were also being extracted he said.

This had become imperative because of opposition from the local people to extending the mining areas in Kanyakumari district.

Mr. Govinda Pillai said vast deposits of mineral sands had been found in Sattankulam area in Chidambaranar district. But since these lands were the reserve forest areas exploratory talks were being held with the State Government officials. Rich deposits of ilmenite, zircon, rutile, and monosite had been found in Sattankulam. In Andhra Pradesh, and in Ratnagiri area in Maharashtra too, mineral reserves had been identified.

CALL TO APPOINT HIGH-POWER PANEL ON CHEMICAL INDUSTRY

The government should appoint a high-powered committee to prepare a perspective plan for the chemical industry covering all the three alternative feedstocks, namely, naphtha, natural gas and alcohol, the All-India Alcohol-based Industries Development Association (AABIDA) demanded.

The manufacture of acetic acid should also be exclusively reserved to use alcohol as a feedstock, the AABIDA president, Mr. S.K. Somaiya, told a press conference at New Delhi on May 10.

This, he said, had become necessary in view of the abundant availability of alcohol within the country. The production of alcohol, through the easily available molasses due to large-scale sugar production, had reached 1000 million litres, the target set by the Bhattacharya committee in 1980, he added. Mr. Somaiya was addressing a press conference on the eve of the annual AABIDA conference and one-day seminar on "alcohol-based industries in the nineties".

He said the perspective plan should study what to do with the glut of molasses and alcohol in the country. It should also decide whether India should continue to export molasses or add value to these by converting them into alcohol. Mr. Somaiya further said India could become a world leader in the manufacture of alcohol-based organic chemicals by using cheap and easily available mollasses.

Replying to the questions, Mr. Somaiya said the alcohol industry was suffering from the high-level of state levies on industrial use of alcohol, ever-increasing cost of fuel and tendency to charge higher prices of alcohol which were not justified by the government-evolved formula.

S. KOREA SEEKS TIE-UP IN DRUG PRODUCTION

The Democratic Peoples' Republic of Korea is wooing the Indian drug industry to set up joint venture units in that country particularly for the manufacture of antibiotics. DPRK does not have a pharmaceutical industry worth the name at present. The general bureau of the pharmaceutical industry of DPRK has requested Organisation of Pharmaceutical Producers of India to inform its members about the prospects of the drug industry in that country.

According to OPPI the government of DPRK will be permitting participating Indian drug companies to have equity participation to the extent of 49 per cent in such joint ventures. Some of the specific drugs in which the DPRK is interested are antibiotics like Kanamycin, Erythromycin and Gentamycin. Drug companies in India have achieved distinction in the manufacture of several antibiotics in a short span of last 10 years.

PETROCHEMICAL PRODUCTS

IPCL to provide data services

Information on basic petrochemical products may be secured from the Petrochemicals Data Services (PDS) set up by at Baroda by the public sector Indian Petrochemicals Corporation Limited (IPCL). This high-tech information centre for "the sunrise petrochemical industry" was set up last year on the premise that a vital factor for successful decision-making is accurate and up-to-date information is available, Ved Mehta, IPCL's chief manager (PDS) said. This is especially true for the fast growing fields such as petrochemicals, where technologists aver that the only thing permanent is change, he said.

The information that can be provvided ranges from availability and commitment of chemicals, polymers and synthetic fibres to demand supply estimates and international price trends. Mr. Mehta pointed out that planners and decision makers have to depend on limited data generated by most of the agencies working independently. Additionally, problems such as authenticity and consistency of data source and basic assumptions made accentuate the pitfalls, he said.

The PDS, set up following recommendations of the Kapoor committee on perspective planning (1985-2000 AD), is designed to provide authentic data compiled from the industry as well as the government, Mr. Mehta observed. Data is communicated according to user's needs and purposes, he said. The PDS also comes out with a weekly business brief on the developments in the industry as well as a quarterly newsletter on synthetic fibres and intermediates, polymers and chemicals detailing international and domestic price and production-consumption trends. However, the present coverage does not include feedstocks imports and technology data. Though information in feed stocks can be made available through the National Oil Co-ordination Committee, import data are more difficult to obtain, according to Mr. Mehta. Similarly, detailed technology briefs are almost impossible to prepare owing to the patent and secrecy laws shrouding a company's process, he felt.

After the PDS has established itself more firmly, it is likely to be made an independent body registered under the Indian Societies Act, he added.

GLOBAL SEMINAR ON GEOTEXTILES IN BANGALORE

An international seminar on geotextiles is to be hosted at Bangalore in November this year by the Central Board of Irrigation and Power (CBI & P), according to Mr. D.K. Satyanarayana Shetty, secretary to the government of Karnataka (Irrigation). Addressing a meeting of chief engineers (irrigation) on 'Plastics lining in the CBI & P, Mr. Shetty noted that in Western countries it had been proved in several instances that plastic materials supported by geotextiles had proved to be a very effective seepage control barrier. In India, research had proved that with the use of plastic linings in canals, the average loss of about 50 per cent of the water through a canal distribution system could be reduced to a minimum loss of between 15 per cent to 20 per cent.

Mr. C.V.J. Verma, member secretary of the CBI & P, stated that two advisory committees, namely the National Committee on the Use of Plastics in Agriculture (NCPA) headed by Dr. G.V.K. Rao and the National Advisory Committee for Research and Development for Plasticulture Development (NACRD), had been set up to encourage the use of plastics in irrigation projects and adduce losses in canal systems wherever possible. The two committees had initiated and established nine irrigation plastic development centres in different states with the last two coming up at Patna (Bihar) and Bikaner (Rajasthan). During 1989-90 the 10th such centre was proposed to be set up at Amritsar (Punjab).

Mr. C.C. Patel, former irrigation secretary to the Govt. of India and UNDP expert said that it was high time that a single ministry was given charge of the overall monitoring of waters so that one master plan could be prepared with all sub-plans dovetailed into the main one. Mr. Patel noted that while tremendous scope existed for more efficient utilisation of irrigation potential, different ministries chalking out separate plans, had led to complete disharmony.

Mr. Patel noted that while the total irrigation potential in the country had been estimated at 113 million hectares, the potential could be increased further to 145 million hectares if state boundaries were disregarded and water treated as a national asset. Mr. D.N. Desai, secretary to the Government of Karnataka, (public works, command area development and electricity department), stated that the construction of plastic linings for canals had not really caught on in the southern states because of certain construction problems. In many instances, the plastic film had been punctured due to the use of unskilled labour. In Karnataka the most popular form of lining was concrete or 'Shahabad stones'.

TWO NEW IPCL DIRECTORS APPOINTED

Mr. N. Chander and Dr. I.S. Bhardwaj have been appointed directors on the board of Indian Petrochemicals Corporation Ltd. (IPCL). Mr. Chander joined IPCL as an accounts officer in 1969 and was Chief Financial Controller at the time of his elevation as Director (Finance). Dr. Bhardwaj, M.Sc., Ph.D. (Canada), joined IPCL's research centre as a polymer chemist in 1970. At the time of his appointment as Director (R & D), he was working as Director of the CIPET, Madras, where he was sent on deputation in July 1984.

Caprolactum imports may be delayed

Inter-ministerial differences are expected to delay allocation of huge funds required for the import of caprolactum, which is likely to starve the nylon yarn and tyre cord manufacturers of their basic raw material. Union textiles and industry ministries favour the proposal for adequate imports of caprolactum to meet increasing requirement of nylon industry, while Union finance and commerce ministries are understood to be keen to see that the industry should earn maximum foreign exchange to fund its own import requirements.

Nylon industry's raw material import requirement is expected to be much larger during the current year as a result of additional capacities coming into production on the one hand and Gujarat State Fertilizers Company (GSFC), the lone producer of caprolactum in the country, supplying smaller quantity to market on account of increase in its captive requirement. GSFC, with a capacity to produce 20,000 tonnes of caprolactum per annum, was supplying around 16,000 tonnes to the nylon industry after meeting its captive requirement for the production of nylon moulding powder. With the result, the industry was recieving around 20% of its requirement from indigenous sources and was dependent on imports to meet the balance 80% raw material requirement.

At the recent meeting held in New Delhi called by DGTD to review the supply and demand position for caprolactum, nylon yarn and tyre cord manufacturers have stated that the yarn production during the year is expected to go up around 40,000 tonnes as compared to around 36,000 tonnes for 1988-89 and that of tyre cord may virtually jump to around 40,000 tonnes from 27,000 tonnes last year.

Thus, the consuming industry's requirement for caprolactum was estimated to go up to around 88,000 tonne However, against this GSFC is report to have informed the meeting that it m supply around 9,000 tonnes of caprola tum to the market, after meeting capti need of around 5,000 tonnes for moul ing powder and supplying about 6,0 tonnes to Gujarat Nylons. Thus, t industry's dependence on imported ra material is likely to go up to arou 90% during the current year.

The Fertilizer and Chemicals, Tra vancore (FACT), another plant for cap rolactum, is expected to go on strea towards the end of the current year, bu consuming industries do not expect an supplies during 1989-90. The govern ment has, therefore, called anothe meeting to review the supply an demand position in September 1989.

The consuming industries fear tha until that time the finance ministry ma not release necessary foreign exchang for the import of adequate quantity o caprolactum.

Proposals to relax FERA norms

Proposals for changes in the Foreign Exchange Regulations Act (FERA) guidelines are now under consideration of the Government to increase exports and encourage foreign equity participation.

One of the proposals is to allow operation of foreign trading organisations in India for procurement of manufactured goods for exports to other countries. At present joint ventures in trading activities with foreign companies are permitted.

The proposal is that such tie-ups may be allowed with well known trading houses in the world such as the Japanese and the South Korean trading houses. Alternatively, foreign trading houses may be allowed to operate in India and link their marketing network with Indian exports.

It is argued that the Japanese trading houses are themselves looking for products that can be produced in other countries and sold under their trade names so that their market share can be maintained in third country markets.

Also, under the pressure of high valued yen, these trading houses are looking for products that can be imported into Japan. For India the gains could be in the form of quality upgradation and certification of export products, penetration of markets not otherwise available and technical assistance in market development.

Another proposal is that Indian trading houses be allowed to enter into trading activities with inputs produced abroad. It is also proposed that foreign companies may be allowed to invest up to 51 per cent by way of equity in manufacturing companies in areas where such participation at present is not welcome. Most of the foreign companies want to retain majority holding while taking up manufacturing activities in India to retain their control over management.

It is argued that since foreign equity is cheaper to service than debt, such a policy will be of help in the current balance of payments situation. At the same time, it would allow technology to come to India more easily.

One area where such foreign equity investment may be encouraged is electronics. The capital goods sector could also do with some fresh infusion of foreign equity. It is felt that by the end of the Eighth Plan the foreign equity investment could easily be doubled by adopting such an approach. It is also proposed that the FERA policy on treatment of bad debts, which is highly restrictive, may be relaxed. In sev cases unforeseen circumstances lea bad debts but the exporter faces a l difficulty in clearing himself with Reserve Bank for carrying out transactions.

A certain amount of flexibility co also be introduced to enable signing contracts and changes in terms wh are necessary for active exporti Much of these changes could be carr doubt by reducing the references req red to be made to the Reserve Ban

These proposals are at different stag of examination at present. Looking the sensitive nature of some of the proposals, the Government may take own time in deciding on them.

OIL COUNTRY TUBULAR

Oil Country Tubular Ltd. (OCTL) s up in technical and financial collabor tion with Baker Hughes Tubular Se vices Inc. US. has commenced produ tion of drill pipes.

The company will soon start trial run of production tubing and casing pipe against large orders received from O India and ONGC. OCTL has alread started inspection services offering it sophisticated scanalog inspection sys tems, the only one of its kind, to O India and ONGC.

HZL earns record profit

Hindustan Zinc Limited (HZL), a ublic sector undertaking engaged in xploration, mining, beneficiation, nelting and marketing of non-ferrous etals like zinc, lead, silver etc., has nown a record post-tax profit.

Mr. A.C. Wadhawan, managing irector, of the company, told a press onference that HZL achieved an esti- nated pre-tax profit of Rs. 35 crores on turnover of Rs. 284 crores.

This is the highest profit ever ecorded by the company since its for- nation in January 1966. Last year, the ompany registered a net profit of s. 3.58 crores. The gross margin arned by the company also reached a ew high of Rs. 72.60 crores.

The company's contribution to the ational exchequer is estimated at s. 68 crores and the foreign exchange aved by the company is estimated at s. 130 crores during 1988-89.

Mr. Wadhwan said that the output rom the mines of the company recorded new landmark in 1988-89. There was n increase of three per cent in the ead-zinc ore production at 15,80,474 onnes over the previous best achieved n 1986-87 and an increase of six per ent over last year. The production of ead-zinc concentrates also registered an ncrease of 11 per cent over last year. his has been the highest-ever produc- on of concentrates since the inception f the company.

Despite the severe drought in Rajas- nan for the past four years, resulting in cute water problem at Debari smelter, he total zinc-lead metal output of 7,208 tonnes was 12 per cent higher nan last year. Zinc metal output of 7,108 tonnes at Debari smelter during 988-89 was 18 per cent up over the revious year's level while Vizag melter registered an increase of 24 per ent. Hindustan Zinc is virutally the nly producer of silver metal from ores in the country and output of this precious metal at 37,748 kg, during the year is also an all-time record. The production of cadmium metal, which is extensively used in high technology industries touched a new peak of 230.5 tonnes, registering an increase of 33 per cent over last year.

HEAVY WATER PRODUCTION TO GO UP

Heavy water production will go up considerably next year with the commissioning of two more plants and the rise in production of several existing plants. The Hazira and Manguru heavy water plants are scheduled for commissioning next year. The hydrogen sulphide generation unit of the Manguru project is ready for commencing production after the necessary safety clearances. The main heavy water plant, including the exchange units and the vacuum distillation unit has been installed.

The Hazira project is based on mono-thermal ammonia-hydrogen exchange process. Pre-fabrication of piping and erection of equipment have been started.

The performance of all the heavy water plants has shown satisfactory results during 1988-89 according to the annual report of the Department of Atomic Energy. This has been done by achieving good stream factor and by resolving some of the constraints in the plants.

More production in all the plants could have been achieved but for some external constraints, the report said. These were power constraint to the fertiliser plant for Nangal heavy water plant, lower pressure and lower deuterium concentration in the feed synthesis gas from fertiliser plants as in the case of Thal heavy water plant, non-availability of feed synthesis gas and other utilities for long periods as in the case of Talcher plant and interruptions in supply of steam for the Kota heavy water plant.

HINDUSTAN DORR-OLIVER

Hindustan Dorr-Oliver Ltd. (HDO), has won a contract for a turnkey chrome ore benefication plant to be set up at Kalliapani, in Orissa, by the Orissa Mining Corporation Ltd. (OMC) against a global tender valued at Rs. 75 million.

OMC is a large multi-mineral mining company with a total annual production of about 18 lakh tonnes of ore. Principally, it mines and exports iron ore, chromite ore, manganese ore, tin, gem stones, etc.

Presently, the high grade lumpy ore containing 52 to 54 per cent Cr_2O_3 is mined and exported mainly to Japan. With depleting reserves, the fines that are being now mined have low Cr_2O_3 content -- in the range of 30-35 per cent. They do not have an export market.

In order to upgrade this low grade ore, OMC is setting up the chrome ore benefication plant which will have a capacity of 1,50,000 TPY. The plant will produce both fines and concentrate containing 55% Cr_2O_3 and sand concentrate containing 51% Cr_2O_3. While the fines concentrate shall be exported, the sand concentrate will be used as a raw material for charge chrome plants.

HARYANA PEROXIDE

Haryana Peroxide has signed a collaboration agreement with Haryana State Industrial Development Corporation to set up a hydrogen peroxide project at Jind in Haryana. The project is being promoted with the equity participation of HSIDC. The project designed to manufacture 5,000 tonnes per annum of hydrogen peroxide at optimum capacity, has been estimated to be set up at a capital cost of Rs. 22.5 crores.

More gas available for power generatio

The natural gas availability profile has changed to the better with 14 million cubic metres per day more expected during the 8th Plan than earlier estimated. It will be enough to meet the demand of fertiliser and power plants and the proposal to import liquefied natural gas (LNG) is being considered.

The commitment of gas to various projects coming up in the 8th Plan is made in advance. The earlier estimates had indicated that the availability of gas in the 8th Plan would be about 70-71 million cubic metres per day. That would not have been enough for all fertiliser plants proposed for the Plan period.

A Secretaries' committee had been appointed to decide on the best use of the available gas. In the begining of the 7th Plan, the use of gas for fertiliser industry was given priority. The thinking then was that use of gas for power generation would be wasting a valuable natural resource. The residual gas after being tapped for petrochemical derivatives is used either for fertiliser, power, or as industrial and domestic fuel.

The thinking now on the alternate uses of gas has taken a radical change. It is reckoned that while fertiliser can be imported, power cannot be. So it is being argued that power generation should get priority in the use of gas. This line is cleared by the Planning Commission also.

In the meanwhile, the decision of the government to permit the private sector in power generation has created a powerful private sector lobby for diverting gas from fertiliser to power generation. The fertiliser lobby which is also powerful had stalled the move demanding the gas to be made available to three more fertiliser plants in the Eighth Plan in addition to the ones already being commissioned in the Seventh Plan. This was inspite of the fact that three fertiliser plants are behind schedule and would go on stream only in the Eig Plan.

The use of gas in power generat is less capital intensive and has a les gestation period. This has made the p vate as well as public sector, to dema gas for power generation. While t controversy on the alternate uses of g is continuing, more and more wells ha struck rich gas.

Though it was dissapointing wi regard to crude oil, it has brightened th supply of gas. The earlier estimate o availability at 71 million cubic metre had been revised initially to 80 millio cubic metres per day. Now it has furthe gone upto 84 million cubic metres pe day, or 30-31 billion cubic metres pe year.

This would mean additional 13-14 million cubic metres per day availabil ity, which is yet to be committed. From the earlier available estimates there was about 5 million cubic metres that had not been committed to any sector. This would make the still uncommitted available gas at 19 million cubic metres.

The additional gas that would be available could easily feed two more fertiliser units in addition to the six already connected to the HBJ pipeline. Similarly, 16 million cubic metres per day had already been committed for power generation. It is possible that with the revised estimate, 10 million cubic metres more could be made available for power generation.

The Centre is also seized with the problem of peak load shortage of power likely in the Eighth Plan. The technical possibilities of diverting gas for power generation in the peak time either from domestic supply or through the import of LNG is also being considered. A separate expert committee with Oil and Natural Gas Commission and Ga Authority of India has been set up for this purpose.

Two more refineries proposed

The Union Government is seriously nsidering a proposal to set up two ore grass-root refineries of six million nnes each -- one in central India and other in the eastern part of the coun-. The public sector oil companies ve been asked to prepare preliminary ports for the proposed refineries.

After extensive studies, the Ministry Petroleum and Natural Gas has come the conclusion that the country will ve to augment its refining capacity by other 18 million tonnes and even to an for 85% self-sufficiency in refin-g by 1994-95. At present, the refining pacity in the country is adequate to fine the crude India produces or ports to meet the requirements of troleum products.

The proposal to set-up the refineries s been mooted in view of the report the high level committee on supply easures. The committee which was set to estimate the requirement of petroleum products and to suggest measures to meet the same had recommended the creation of additional refining capacity of 36 million tonnes by 1990-2000.

The existing refining capacity in the country is 48.70 million tonnes per annum (as on April 1, 1988), which includes swing refining capacity of two million tonnes per annum (MTPA). This is anticipated to increase to 63.75 MTPA by 1994-95. This includes expansion of some of the existing refineries and setting up of new refineries at Karnal (6 MTPA), Mangalore (3 MTPA) and in Assam (2 MTPA).

The proposed refinery at Karnal will be in the joint sector. The joint venture company will have Indian Oil Corpn. as the public sector promoter with Tata Chemicals Ltd. the private co-promoter. Each of these promoters will hold 26% of the equity. After the investment decision is taken, it is likely to take four to five years to commission this refinery.

The Government has also decided that a detailed project report (DPR) will be prepared for a three million tonnes per annum petrochemical refinery to be set up at Mangalore in Karnataka. This refinery also will be in the joint sector with HPCL as the public sector co-promoter and Indian Rayon Industries Ltd., as the private sector co-promoter. The detailed project report was submitted to the Government in March and is under consideration.

In addition, the Government has also decided to set up a 2 MTPA refinery in the public sector in Assam under the accord. There would also be a provision for increasing the capacity of the refinery up to 3 MTPA, subject to the availability of crude.

In addition to the proposed three new refineries, there would also be expansions in the capacity of the Koyali Refinery from 7.3 MTPA to 9.5 MTPA and Mathura Refinery from 6 to 7.50 MTPA.

ONGC seeks crude price hike

Fluctuations in the foreign exchange rates cost the Oil and Natural Gas Commission (ONGC) Rs. 463 crores last year on its borrowings abroad. The ONGC chairman, Col. S.P. Wahi, said the government could compensate the ONGC for the loss by raising the price of crude.

Col. Wahi said that ONGC had sought a Rs. 400 hike in crude price, which had remained static at Rs. 960 a tonne since 1981. The ONGC profits had increased despite the crude price remaining at the same level for several years.

The ONGC chief said the available production capacity of oil and natural gas was not being fully utilised because of infrastructure constraints. Development of pipeline network, for instance, had not kept pace with the exploration activity and consequent increase in the production capacity. Only 70 per cent of associated gas produced in the ONGC structures was being utilised. For instance, gas valued at Rs. 300 crores a year was flared at Bombay High.

Sponge iron projects

Many proposals for setting up gas-based sponge iron plants are hanging fire in the absence of a clear-cut policy decision by the Petroleum Ministry with regard to the use of natural gas for such projects.

Some of the private proposals, the fate of which are yet to be decided, belong to Gold Star Steel and Alloys, Sunflag Iron and Steel and Hindustan Electrographite. So far, only Essar and Grasim have been allowed to set up gas-based sponge iron plants.

It is the Government's policy not to set up any integrated steel plant in the next decade as they are highly capital-intensive. Additional steel capacities are to be created only through the direct reduction (DR) route. Steel scrap, th traditional raw material for the electr arc furnaces is not only becoming cost but also scarce. Therefore, the Goverr ment's accent is on creating enoug capacity for sponge iron production.

According to an estimate, the coun try must develop a capacity of 5 millio tonnes of sponge iron in the Eighth Plar

While many private sector companie are keen to enter the field, indecision o gas puts them off. For instance, althoug four million cubic metres of gas is being produced on the east coast, the Minis try has yet to make up its mind or releasing this gas for these plants.

The shortage of pellets may also hinder the progress of the sponge iron industry. These plants have to use minimum of 50% of the charge in the shape of pellets. The quality of the pellets produced at the country's sole plant at Kudremukh is not considered to be much suitable for such plants. The Eighth Plan sponge iron target would require a minimum capacity of three to four million tonnes of pellets per annum.

Shortage of high quality lump ore is another hurdle. The gas-based plants use lump ore to the extent of 30 per cent. The ore has to be of high quality not only with respect to chemical specifications but also in respect of other metallurgical specifications. A survey has shown that most of the iron ore deposits in the country except Bailadila do not meet the DR specifications.

HMIL PLANT COMMISSIONED

Hydranautics Membrane India Ltd. (HMIL), a joint venture set up by Ion Exchange India Ltd. and Hydranautics of the United States, commissioned its plant in March this year. The Indo-US venture will begin commercial production of state-of-the-art reverse osmosis membranes by July, according to company sources. At present, such membranes are totally imported.

RPG-Linde venture granted LI

Clearing the lingering doubts about the fate of the Linde proposal for a naphtha cracker complex near Madras, the Union Minister for Petroleum and Natural Gas, Mr. Brahm Dutt, announced that "a letter of intent has been given to Goenka-Linde".

Replying to a question at an informal meeting with newsmen, he said the letter of intent issued to the R.P. Goenka-Linde venture is the first of its kind. "We had not (so far) allowed any unit of this type", he added, pointing out that the proposed 100-per cent export-oriented cracker complex will be based on "totally imported naphtha".

Nevertheless, the Government has taken note of the preparedness of Madras Refineries Limited (MRL) to supply a part of its currently-assessed surplus naphtha to the Goenka-Linde project should the need arise, the Minister said, in reply to another question.

As for the exact location of the Linde project, Mr. Brahm Dutt indicated that the plant will indeed come up near Madras itself, though a final decision is yet to be taken. As for the MRL-SPIC aromatics project at Manali on the outskirts of Madras, the Minister said there need be no apprehensions about its implementation, despite the Prime Minister, Mr. Rajiv Gandhi's recent decision to put off a planned programme of laying the foundation-stone for the project.

Mr. Brahm Dutt claimed that he himself had suggested to the Prime Minister not to lay the foundation-stone before the final project clearance is officially accorded. The process of giving the final clearance to this aromatics project, entailing a capital outlay of the order of Rs. 800-900 crores, is being expedited following the commencement of work on the preparation of a detailed project report, the Minister added.

The Minister also stated that the country must first have regional gas grids leading to a national gas grid. "We must be pragmatic. Even 40 years after independence, a national power grid has not been achieved. First of all, we have to do regional planning and regional grids have to come about", he said.

To a question whether the Centre was discriminating against the South by not extending the Hazira-Bijaipur-Jagdishpur gas pipeline to the South which was short of electricity, Mr. Brahm Dutt said, "not at all. It is a false notion. Don't make (the country) into compartments". He said the HBJ pipeline was laid in North because Punjab, Haryana and Uttar Pradesh formed the "granary" of India. The North had no oil or gas potential unlike the Krishna-Godavari and Cauvery basins. Besides, the South was not in short supply of fertilisers and petroleum products.

"No discrimination"

Why could not the 1,700-km HBJ gas pipeline be extended to South which could make use of the gas for producing electricity? Mr. Brahm Dutt said that "it is not financially wise according to all calculations". Asked if he was ruling out a national gas grid, he said, "I am not ruling out a national gas grid. It has to be part of perspective planning." When a newsman said that Northern and Western India had excess electricity and still they had the gas pipeline, he said. "I don't go by this idea of parochialism." He denied that the North had surplus electricity. "In North, I am accused of not giving importance to oil exploration", he said.

Would his Ministry act on the Tamil Nadu Chief Secretary's suggestion that the gas pipelines in the Krishna-Godavari and Cauvery basins could be connected for the economic development of the region, Mr. Dutt said that "first of all, the Cauvery Basin should have a pipeline. The KG Basin has more gas and less of oil but the Cauvery Basin has more oil and less of gas. When technical requirements and financial viability are there, we will mix them up". Regional gas grids were being planned in Tamil Nadu and Andhra Pradesh. Similar gas grids should be set up for using the gas found in Tripura and Assam.

Distillation plant for Thanjavur

The detailed project report on setting up a crude distillation plant at Thanjavur was ready. It was a distillation plant and not a refinery because the quality of crude available in Thanjavur was good. The plant would cost Rs. 120 crores and its capacity would go up if Tamil Nadu faced a shortage of petroleum products.

Mr. Brahm Dutt also ruled out the Tamil Nadu Chief Secretary's plea for importing crude so as to change the face of the proposed crude distillation plant in the Cauvery basin and convert it into a full-fledged refinery. Rejecting the idea of installing initial processing capacity of two to three million tonnes of crude at this project near Thanjavur, the Minister said the distillation plant, with 0.50 million tonne processing capacity will be set up very soon. The detailed project report on this Rs. 120-crore project is now ready.

Answering a question on the Oil and Natural Gas Commission's deal with Reliance for the supply of cracker-grade naphtha from the former's Hazira gas processing complex, the Minister claimed that there is nothing unusual about this arrangement under which sweetened gas will be supplied to Reliance only after fulfilling the supply commitments to other consumers.

200 AFFECTED BY CHLORINE LEAK

Over 200 persons have been affected by the chlorine gas leak in north-west Delhi on May 5. More than 50 of the affected continue to receive treatment in hospitals for symptoms of gas poisoning while the rest have been discharged.

ONGC wants 'freedom' from Plan par

The Oil and Natural Gas Commission (ONGC) has asked the Centre for "controlled autonomy" from the jurisdiction of the Planning Commission. The suggestion, for which there has so far been no response, is aimed at speeding up the execution of its Plan programmes.

Disclosing this at a press conference, the ONGC Chairman, Col. S.P. Wahi, said that "ONGC has suggested to the Planning Commission: free us out of your Plans". The signing of a memorandum of understanding with the authorities concerned should suffice for pinning down ONGC on the question of achieving the agreed performance targets, he explained.

He would describe the arrangement now being sought as "controlled autonomy" and not total autonomy. (The Planning Commission can firm up ONGC's outlay, targets etc. and keep a general watch over the organisation's performance). Mr. P.K. Chandra, ONGC Vice-Chairman, explained that what is being sought is a certain freedom of action to implement Plan schemes, without having to rush to the Planning Commission for clearance of each approved scheme at every stage.

At present the Planning Commission has to be approached before commencing work on every Plan scheme with a capital component of Rs. 20 crores and above, he said. The ONGC Chairman outlined two areas of vital concern to ONGC at present, namely oil exploration in deeper waters and the exploration of basins abroad. Geological reserves of 5 billion tonnes of oil and oil-equivalent-gas are said to be open for exploration if drilling below water depths of 200 metres is undertaken.

This is in addition to 20 billion tonnes of reserves already prognosticated geologically all over the country. As for exploration of oil basins abroad, at such places as Vietnam etc., Col. Wahi said that it is not incongruous that ONGC should seek to explore abroad when some off-shore Indian blocks themselves are offered to foreign companies for exploration. Oil exploration bei "scientific gamble", there is not amiss in India trying to put its skil work abroad, he added.

Asked about the progress of the S et exploration in certain earmarked a of the Cauvery and Cambay inland sins, Col. Wahi said "we are push the Soviets (to deliver the goods). A all, our money is involved". Turnin ONGC's performance in the fiscal y just ended, Col. Wahi said the organi tion lost Rs. 463 crs. in exchange rat uctuations on borrowings made abro

Investment in South up

As for ONGC's southern region, C Wahi said the investment quotient gone up from Rs. 540 crores in Sixth Plan to Rs. 1,686 crores in Seventh Plan, with the Eighth Plan o lay proposed at Rs. 3,805 crores. The were only 3 drilling rigs in the area 1980-81. Now there are 19, with a p posal to deploy 55 rigs by 1994-95. A ready, an annual oil production pote tial of 0.20 million tonnes in the sout ern region has been delineated in t Seventh Plan, while the conservati estimate for the Eighth Plan is 2.05 m lion tonnes before the end of the fiv year period, Col. Wahi said.

The feasibility report will be ready June this year for a Rs. 250-crore fi phase development of PY-3 structur off the Tamil Nadu coast, with 20,00 barrels a day being the production po ential in this first phase. An investme decision on PY-1 structure, also off t Tamil Nadu coast, will be taken in eig to nine months. The potential here 3.68 lakh cubic metres of free-flowin gas a day. Exploration in the Palk Ba and the Andamans will be resumed i due course after sorting out the logis ical problems. While the Soviet tea has not had much success after their in tial discovery of traces of oil in a we in its exclusive zone in the Cauver inland basin, ONGC has also come u with a "technically dry well" Komaarakshi, a super deep well sit elsewhere in the Cauvery inland bas

KGC basins now upgraded

The Krishna-Godavari and Cauvery (KGC) basins have been upgraded to Category I thus joining the list of oil and gas producing basins in the country, the Minister of State for Petroleum and Natural Gas, Mr. Brahm Dutt, said. Till now, they were classified as Category II basins, which meant that geological reserves of oil and gas had been established on a commercial basis.

Significant discoveries of oil and gas have been made in the KG basin in Andhra Pradesh and Cauvery Basin in Tamil Nadu, the Minister said inaugurating a seminar on "Indigenisation of oil field equipment and services" organised by the Oil and Natural Gas Commission. About Rs. 1,300 crores has been invested in the exploratory effort in the KGC basins so far. The ONGC should plan regional gas grids for developing the southern region. Fertiliser plants, sponge iron units, power generation projects, petrochemical and agro industries would be set up in these areas, he said.

The Eighth Plan, which is being finalised, lays emphasis on indigenous development of energy sources and effective use of natural gas, among other things. Thanks to the deliberate efforts of the ONGC to promote self-reliance in oil equipment and services, indigenous industry is now manufacturing back-up rigs, drill ships, supply vessels, platforms, land rigs and well-heads, etc. The Government had approved 200 joint ventures in areas of oil exploration, drilling, production and services. In drilling alone, the 31 joint venture companies have been cleared now as the opportunities offered by the oil sector to indigenous industry.

The ONGC has also thrown open new areas for the industry to step in, Mr. Brahm Dutt said. These include repair & maintenance, warehousing of spares and transport services like heavy vehicles and cranes. The government has raised the level of price preference for indigenous industries to 40% on a grade basis for services.

National grid

The ONGC Chairman, Col. S.P. Wahi, said the national gas grid deserved major thrust from the Government. "I appeal to the Minister that this project should be given high priority". A national gas grid is the cheapest means of transferring energy from one place to another. If there were financial constraints, the ONGC could mobilise money from abroad and make the gas grid a success. This, he said, would create an economic revolution in the country. As such, "this deserves very high priority", he stressed. "We are sitting on huge deposits of gas in Tripura, and KGC. We are likely to find gas in Jammu and Kashmir and Himachal Pradesh." Col. Wahi regretted that industry's involvement in the oil sector was not significant. "We do not find any interest from industry in research and development inspite of repeated requests." The ONGC is willing to join the industry, with money in R and D on oil field equipment. There would be plenty of opportunity for the industry in the oil sector not only in India but also in Iran, Iraq, New Zealand, China and South East Asian countries.

Happy mix

The ONGC is spending Rs. 100 crores a year on indigenisation efforts and is giving importance to technology transfer. It would not acquire all the capital equipment as in the past. There would be a "happy mix" of acquisition and charter-hiring of equipment. A consortium has been formed of shipyards dealing with the ONGC's activities so that it's requirements are met. In 1980-81 ONGC's Plan expenditure was Rs. 450 crores a year. It will be Rs. 4,500 crores a year at the end of the Eighth Plan, indicating the type of opportunities available to the industry.

Gas would emerge as the most important energy source in the country and, industry and trade should participate in processing and transporting gas, Col. Wahi said. The total requirement of oil would not be more than 75 million tonnes by the end of this century. ONGC would produce 65 million tonnes by A.D. 2005. Oil India would also produce oil. The country would be able to achieve self-sufficiency in oil provided the demand was managed properly. Hence gas utilisation should be given a major thrust.

Gas pipeline

The Tamil Nadu Chief Secretary, Mr. M.M. Rajendran, fully supporting a national gas grid, said as a first step, the KGC basins could be interconnected by a gas pipeline for quick economic development of the region. The available gas should be earmarked quickly so that preparatory steps could be taken for its utilisation.

"We have a serious power problem, and gas-based power plants will be of great benefit to power-starved Tamil Nadu", he said. The present power-cut in Tamil Nadu is due to reasons beyond the control of the State Government. It has been caused because the Central sector power stations in Neyveli, Kalpakkam and Ramagundam have not been able to deliver the promised output, he said.

The oil distilling unit (of 0.5 million tonnes capacity) to be set up in Thanjavur should be converted into a refinery of two to three million tonnes capacity so that crude also could be imported for refining. Mr. Dutt should take up with the Surface Transport Ministry, the expansion of nearby Nagapattinam and Cuddalore ports. The port at Ennore in Madras would be developed and the Petroleum Ministry should set up a terminal for the products of MRL and other petrochemical complexes being set up in the area. The State Government would provide all support.

Mr. S.K. Manglik, Member (Technical), ONGC, said the Commission is giving a major thrust in the south for hydrocarbon exploration. Mr. R.N. Basu, Deputy Director-General, Technical Development of the Union Government, said the Directorate was actively engaged in identifying the oil equipment and services to be indigenised and also in indigenising them.

Integrated plan for Ratna field drawn

The Oil and Natural Gal Commission NGC) has drawn up an integrated n for the development of R-7, R-9 l R-13 structures of the Ratna field he western offshore at a cost of about . 400 crores. The three structures ng close to each other are located out 60 km south of Heera field.

The proposed facilities for the devel- ment of these three structures include ction of three well platforms, process tform, water injection and gas lift es, and an oil feeder line from the ocess platform to R-12 structure.

The oil from these structures would transported through the newly pro- sed pipeline from the process plat- m R-12 to Heera/Uran via the sting pipeline between Heera and 12. The R-12 structure in the Ratna d has already been put on production ce November 1982.

R-7, R-9 and R-13 together have ological in-place reserves of 28.38 lion tonnes. ONGC is presently pro- cing about 21.12 million tonnes from Bombay High, Heera, Ratna and na fields in the western offshore. It ns to increase production by about 7 lion tonnes by the terminal year of Eighth Plan (1994-95).

The entire production increase in the stern offshore would be contributed fields other than Bombay High. The- upcoming fields include Heera, Pan- Neelam, B-57, Ratna and R series, /CD-D18, Bassein Condensate, etc.

The total annual production from the stern offshore by the end of the hth Plan is expected to be 27.50 mil- n tonnes. The cumulative oil produc- n during the Eighth Plan from here kely to be about 121 million tonnes.

Gas production from Western off- re is also going to increase signifi- tly. As against an expected duction level of 25 million cubic metres of gas per day during 1989-90, the production (including free and associated gas) is expected to be around 48-49 million cubic metres per day by the terminal year of the next Plan.

According to official sources, several new fields like mid and south Tapti, S-1 and of Bombay High, H-55 and South Bassein gas field would contribute to this production.

Over the years, the total oil reserves in the western offshore have increased from 512 million tonnes as on January 1, 1975 to 2202 million tonnes (as on January 1, 1988). Similarly gas reserves have also recorded over 10 fold increase. Twenty-five new discoveries have been made in the Western Offshore since 1980, comprising 13 oil, 6 oil and gas and 6 gas discoveries.

During the Eighth Plan, ONGC has a programme to sink 343 wells by drilling 8.2 lakh metres as against 203 wells (exploratory metreage of 5.5 lakhs), drilled during the current Plan.

The number of developmental wells drilled during the Eighth Plan is expected to be 514 compared to 325 wells during the present Plan. The number of rigs to be deployed in the next Plan would go up to 180 from the level of 100 during the current Plan. Sixtyone well-cum-process platforms and 13 process platforms are also planned to be set up during the next Plan.

The latest state-of-the-art technologies such as sub-sea completion, multiple well completion and horizontal drilling which were introduced successfully during the Seventh Plan would be used on a wider scale during the Eighth Plan.

ONGC is deploying floating early production system in the Western Offshore for early exploitation of some of the newly discovered structures. This system will be extremely useful for collection of reservoir data at an early stage which will help in reducing the time taken to formulate the final development plan by at least two to three years. In offshore, the first early production system -- Sagar Lakshmi -- was commissioned in December, 1986 in the Panna field. It is now considered to deploy the floating production system at D-18 structure located 40 km south west of Bombay High.

The concept of floating early production system would gradually be introduced to other structures as well. This would also give experience to ONGC to operate similar type of systems for production from deeper waters in future.

6 REFINERIES EXCEED CAPACITY UTILISATION

Indian Oil's six refineries in Guwahati, Barauni, Gujarat, Haldia, Mathura and Digboi have exceeded their capacity utilisation for the fifth consecutive year. During 1988-89, the refineries achieved a record crude throughput of 22.0 million tonnes against 21.787 million tonnes in the previous year. The crude throughput could have been still higher but for lower supplies of Assam crude to Guwahati and Barauni refineries, according to a press release.

Crude throughput duirng the year also exceeded the total oil economy budget (OEB) target of 21.9 million tonnes. The capacity utilisation was 103.5% as compared to 102.5% last year. Mathura refinery achieved the highest ever crude throughput of 6.557 million tonnes during the year. The previous highest was 6.535 million tonnes in 1987-88. The highest-ever crude processing of 8.656 million tonnes was achieved at Gujarat refinery during the year, registering an increase of 2.5% over the previous year. The previous highest was 8.443 million tonnes in 1987-88. Digboi refinery achieved a record crude throughput of 0.574 million tonnes against OEB target of 0.5-25 million tonnes.

Package for services exports announced

In an effort to boost the export of services, the government has come out with a three-year project assistance scheme under which 10 per cent cash compensatory support (CCS) will be granted on the basis of net foreign exchange earnings from the services components of turnkey or package projects.

This has been done by amending the circular dated March 31, 1989 of the ministry of commerce spelling out the new CCS policy for the current year. The 10% CCS for project assistance would apply to the services component of turnkey projects and package projects of civil engineering construction and would also include computer services and software exports.

The assistance will be available for the following types of contracts:

-- turnkey projects viz., those which involve rendering of service like design, civil construction, creation and commissioning of plant or supervision thereof alongwith the supply of equipment.

-- Engineering service contracts involving supply of services alone such as design, erection, commissioning or supervision of erection and commissioning.

-- consultancy service contracts which may include preparation of feasibility studies, projects reports, preparation of designs and advice to the project authority on specifications for plant and equipment, preparation of tender documents, evaluation of tenders and purchase of plant and equipment.

-- civil construction contracts involving preparation of designs, drawings etc., for the civil work to be undertaken.

-- operation and maintenance service contracts and

-- computer services and software.

Exports of these items made on after April 1, 1989 would get the cession and the scheme will be valid t March 31, 1992. The existing condition governing the admissibility of CCS o export of engineering goods will b applicable for this scheme as well.

It is expected that with this projec assistance, the export of services will ge a shot in the arm. Various export pro motion councils have been pleadin with the government for this assistanc for quite some time. The electronics an computer software export promotio council particularly had strongly take up the matter since it felt that th exporters of software were greatly i need of some cash compensatory sup port.

The council has now welcomed the step taken by the govt. and is confident of achieving this year's target of Rs. 220 crores in software exports. During 1988-89, exports from this sector had been estimated at Rs. 100 crores.

Highlights in Chemical Technology (Part-2)

METPOLAM — A NEW PROCESS TO BIND PLASTIC TO METAL

With the invention of a new process for manufacturing metal cans and their components, Metal Box has galvanised the packaging industry, if not its products. The new process is called 'Metpolam' and is reported to be the best development of the year 1988, in paper and packaging sector in Britain.

Metpolam is described as an unique method of bonding plastic on to metal without the use of separate adhesives, it provides more robust corrosion protection than lacquering or varnishing as well as being energy efficient and virtually fume free. Metpolam can be applied to the metal substrate before it is turned into the required shape. Previously cans had to be lacquered either in sheet form before assembly or individually, after being formed to prevent fracturing the lacquer.

Demand for Metpolam is anticipated to be so great that the company will be granting licenses to major steel manufacturers worldwide. Negotiations have just been concluded for a first such agreement with Carnand, the French packaging manufacturer.

Researchers at the Technical Dept of Metal Box (UK) are also excited by further improvements. So far the use of Metpolam has been restricted to food and beverage cans, aerosols and paint cans. When thickly coated, the product may offer the attractive feel and hygienic look of plastic with the barrier integrity of metal. It also promises faster manufacturing speeds than those for pure plastic packaging. Metal Box seems to have produced its own version of Cartesian philosophy: 'I think therefore, I can'. (*Management Today* Dec/1988, p. 51)

BULLET PROOFING BREAKTHROUGH WITH NEW POLYETHYLENE FIBRE

Allied Signal Inc (USA) has developed a new composite for making bullet resistant vests that weigh less and offer more protection than those now available based on aramid fibres.

Vests made of the new composite (based on a proprietary polyethylene fibre), can withstand even powerful sub machine gun bullets and has successfully passed the stringent test specified by the National Institute of Justice for police and law enforcement agencies.

The patented composite 'Spectra Shield' is also being used in USA to develop rigid vehicle armour, barricades and helmets.

Vests made from the new composite are 25% lighter than conventional body armour. In contrast with aramid fibre vests they retain these bullistic integrity when subjected to moisture and they offer more energy absorption, the company reports.

'Spectra Shield' developed over the past 4 years by Allied Signal is a new landmark in the bullistic armour business, particularly in the lighter weight bullistic armour.

'Spectra' fiber is a proprietary polyethylene fibre that is reported to be pound for pound ten times stronger than steel and the strongest fibre ever made by man.

Commercial quantities of 'Spectra Shield' will be manufactured at Cape Composites of San Diego. It will be a serious competitor to the aramid based law enforcement armour and the company hopes to take a major position in the $50 million market for law enforcement armour. The company is actively pursuing contracts in the US Military Personnel Armour System Ground Troops (PASGT) market, which is estimated at $500 million per annum. Further, the company's new composites based on polyethylene are being used by a number of leading manufacturers of bullistic armour. (*CMR*, 1/30/89, p. 9).

A NEW BREAKTHROUGH IN FREE RADICAL REACTION

A new reaction which involves highly unstable units called free radicals will enable researchers to synthesize drugs more efficiently than before.

Canadian and Italian researchers have recently developed a compound that will make the use of free radicals a practical proposition for pharmaceutical industry. Until now the most efficient reactions involving free radicals have required toxic compounds as reagents, so they have not been used.

Researchers make radicals by pulling an atom or group of atoms out of a molecule leaving behind an unpaired electron on the molecule. The resulting structure is called a free radical centre. The unpaired electron tries to pair up with an electron in another part of the same molecule, or in a different molecule — a process that makes it highly reactive. Unfortunately, radicals are normally difficult to control, but their great value is their ability to make ring structures in molecules.

If the researchers make a free radical centre at the end of a strand of atoms in a molecule, the strand can loop back and bind to another reactive site in the molecule, forming a ring.

The reaction is like closing the clasp in a necklace, where the radical forms

the clasp. Most biologically active molecules, such as drugs, are made up of atoms arranged in rings. Chemists could therefore use the technique to synthesize such products.

The usual method of making free radical centres involves pulling an atom of iodine or bromide out of a molecule using a compound containing tin. Unfortunately, most tin compounds are extremely toxic and drugs made by these routes will always contain residues of tin. As a result, agencies that regulate the pharmaceuticals industry, such as the FDA in USA, finds such methods inacceptable and so manufacturers of drugs have not so far used free radicals.

Researchers working at the National Research Councils of Canada and Italy, have found a non-toxic substitute for the noxious tin compound. The new compound is called tris (trimethylsilyl) -silane. The compound works as well as the tin based material. It produces radicals extremely effectively.

The researchers have already worked out how to use the compound as a catalyst so that they need only small amounts for the chemical reactions. (New Sci., 10/6/88, p. 27)

LASER HARNESSED TO DETECT GAS LEAK IN PIPELINES ECONOMICALLY

The Gas Research Institute in Chicago USA is studying a new technique to detect leaks in pipelines that carry natural gas, using a laser flown above the pipe in an aeroplane. At present pipe lines are checked for leakage by eye from aeroplanes a few times a year, but can spot only the most obvious leaks.

Once a year, an inspector on the ground must walk the line with a portable gas detector to locate the leaks that are not visible from the air. This cumbersome procedure costs $500 per Km, of pipeline and is also slow, since fences and other barriers prevent the inspector from travelling more than 8 to 16 Km per day.

After processing, the composition of natural gas is typically around 95% methane with a per percent of ethane. It is very toxic in high concentrations. Inspectors are not sure exactly how much gas is lost from the 640,000 Km of transmission lines that distribute gas around the USA because their procedures for measuring and accounting for the gas are not very accurate.

The amount of gas 'unaccounted for' in 1986 was 8.75 billion cubic metres according to Barnett Groten, executive director of the Energy Centre at the University of Oklahoma. This is about 2.4% of the total of 368 billion cubic metres of gas transmitted across the USA every year. The Gas Research Institute estimates that between 1 to 2 percent of the gas in pipelines leaks out.

The prototype laser from Petrolaser of Las Cruces, New Mexico, looks for the ethane that leaks from the pipes. The Gas Research Institute hopes the laser will allow its inspectors to detect at least 1 ppm of ethane in a plume of gas several metres high.

The laser system illuminates the pipeline simultaneously with two infrared wave lengths at 3.1 and 3.21 micrometres. Ethane absorbs the two wavelengths differently, but the area around the pipe will look the same at either wavelength.

Using this technique the inspectors can therefore build a picture of the concentration of the ethane by subtracting the image at one wavelength from the image at the other wavelength.

The laser system warns inspectors of high concentration of ethane and records the inspection on video tape. By flying the system over the pipeline in a small aeroplane, the scientists can gather information for less than $100 per Km of pipeline. (*New Sci.*, 10/8/88, p. 32)

NATURAL FATTY ALCOHO BOOSTED AS RAW MATERI FOR DETERGENT SURFACTANTS BY HENKE NEW TECHNOLOGY

Henkel, (West Germany) which major oleochemicals producer, favouring natural fatty alcohols as a material for detergent surfactants 1988, Henkel announced, wha regards as a major breakthrough in r tor and catalyst technology wh allows the direct 'one-step' hydroge tion of triglycerides to high quality f acids.

The company now believes that, the long run, fatty alcohols, in wh Henkel has a 20% share in the wo market, are more economical to produ from natural fats and oils than from p rochemical feedstocks. They also ha ecological advantages in that they a easily biodegradable and natural f and oils are renewable. (*CMR*, 1/30/8 p. SR'12)

DIGITAL-PAPER — A NOVEL PLASTIC FILM FOR OPTICAL DATA STORAGE

Digital paper, a plastic film for opt cal data storage, is the culmination two years in the laboratories at a co of some 10 million pounds to ICI (UK Digital paper was nominated as the be British product from research for 198 in the chemicals sector, for its range applications. Although not yet on th market, it will provide a significantl cheaper, more flexible medium for da storage.

Essentially an alternative to rigi storage media (such as floppy discs digital paper has the advantage of flex ibility — it can be slit into lengths fo use in a tape, cut into circles for disks formed into a cylinder or chopped int strips or tags. According to ICI it als records data faster than other media an will be cheaper.

ICI began researching optical data rage in the early 1980s. Although it ked first at rigid media, a technol- y led group was then formed to exa- ne flexible products. Explains ichael Strelitz, marketing manager at I Image Data, 'ICI researchers were ing three basic ICI skills, Melinex lyester film, dyes and coating tech- logies. Once the product was devel- ed, ICI approached Iomega, a disc ive manufacturer in USA, to develop flexible optical disk drive, and Creo lectronics of Canada to produce an tical tape drive.

Applications are varied; satellites, for ample, could use digital paper to col- t meteorological data, manufacturing mpanies could use it for CAD and in e office, digital facsimiles could be oduced. (*Management Today*, Dec 88, p. 52)

I ANNOUNCES ETHYLAMINES EXPANSION ROJECTS

ICI recently announced its plan to west £8 million ($14.1 million) in a oject to debottleneck its methylamines ant at Billingham (UK). The project ll increase the plant's capacity from ,000 ton/yr to 36,000 ton/year and ll also lead to increased flexibility of ant operation.

The investment underpins ICI's velopment of its alkylamines and rivatives business based on its inte- ated position upstream in raw mater- s and downstream into derivatives chnology and applications expertise.

ICI's manufacture of methylamines based on methanol and ammonia nich are also produced at its Billing- m site. The majority of ICI's methyl- nines are converted into a range of rivatives viz. dimethylformamide, nethylacetamide, choline chloride and kylaminosethanols. In addition, ethylamines are sold as chemical ermediates into a wide range of industries, such as pharmaceuticals, agrochemicals, fibres and the additional capacity will support the development of these applications. (*ECN*, 2/20/89, p. 26)

A NEW HIGH TEMPERATURE SUPERCONDUCTOR SHATTERS THEORIES ON SUPERCONDUCTIVITY

Japanese researchers have made several new high-temperature superconductors in which electrons rather than holes, are involved in superconductivity. The discovery of these new materials will help researchers to 'zero in on what the proper theory of superconductivity is' according to Du Pont researchers. The development would also open up a whole new field for the synthesis of superconductors.

All the high-temperature superconductors made so far become superconducting because some of the electrons that physicists normally expect to be present in the material are missing. These missing electrons are known as holes and behave as electrons would if they had a positive, rather than a negative charge. For superconductivity to occur, these holes must first pair up.

Theories on how super conductivity occurs have attempted to explain how these holes, which have the same charge and so should repel each other, can bend together to form pairs. The new discovery, by Yoshi Tokura and his colleagues at the University of Tokyo, will not greatly upset these theories, as the repulsive force between two electrons should be exactly the same as that between two holes. However, some of these theories are better suited than others to explain the possibility of electrons playing a part in superconductivity.

The high-temperature superconductors made to date have all contained layers of copper and oxygen atoms, in which six oxygen atoms surround a copper atom. Four of the oxygen atoms are in the same plane, while one is above and the other below. Physicists cell the two atoms that are out of the plane as the apex oxygen atoms.

Physicists believe that superconductivity occurs in these copper and oxygen layers. However, the apex atoms are missing in the new materials. According to Vic Emery of the Brookhaven National Laboratory (USA), some theories rely on the presence of these apex oxygen atoms. Physicists therefore, must consider this new evidence and how electron conduction will fit into their theories. The new materials are based on cerium, copper, oxygen and either neodymium, praesiodynium or samarium. Their highest transition temperature is 24 Kelvin (-249°C) — over 100°C lower than the 'hottest' high temperature superconductor. Emery reports that the new materials are 'more exciting because there is so much potential for revealing what is going on'. (*New Sci.*, 2/4/89, p. 33).

AKZO STARTS UP NEW WASTE INCINERATOR

Akzo's Resins subdiary Synthese has started up a waste incinerator at Bergen Op Zoom, the Netherlands. The total cost of the unit, some Dfl. 3.5m ($1.7m), was partially subsidized by the EEC. The unit incorporates novel technology developed jointly by Akzo Engineering and Synthese. Gases, including aldehydes, waste water and liquid organic resin waste are burned at 900-1000°C while the energy recovered from the process will cut Synthese's fuel bill by DFL.120,000/year.

The incinerator, which is only permitted to treat the company's waste, is currently operating at 60% of its undisclosed total capacity. Synthese says the excess burner capacity will meet future expansions in manufacturing at Bergen Op Zoom. Around 55,000 ton/year of resin products are currently made at the site.

Materials Management (M.M)
Part IV - Purchasing and Procurement (Contd.)

N.R. PAI

Purchasing Cycle

Purchasing can be looked upon as "purchasing cycle". It consists of several successive steps which keep on repeating for every purchasing operation. The cycle generally starts from other organisational departments outside the purchasing section.

Thus, to start with, purchase requisitions are received by purchase department from other functional sections of an organisation. These requisitions are scrutinized by the purchase department from three angles:

i) Whether it is signed by the authorised person.

ii) Whether material ordered is properly described. Sometimes drawings and sketches may be needed so that the supplier can cater to the exact needs of the buyer.

iii) The third point has a bearing on "value analysis" techniques. It looks into any other suitable alternative raw material which will do the same job without any flaw. This scrutiny in turn has two aspects.

a) Cheaper substitute for existing raw material which can do the same job without lowering the quality of the service rendered by the final finished product.

b) Better substitute for existing raw material which would improve the quality of final finished product and at the same time which would fit in the required cost structure.

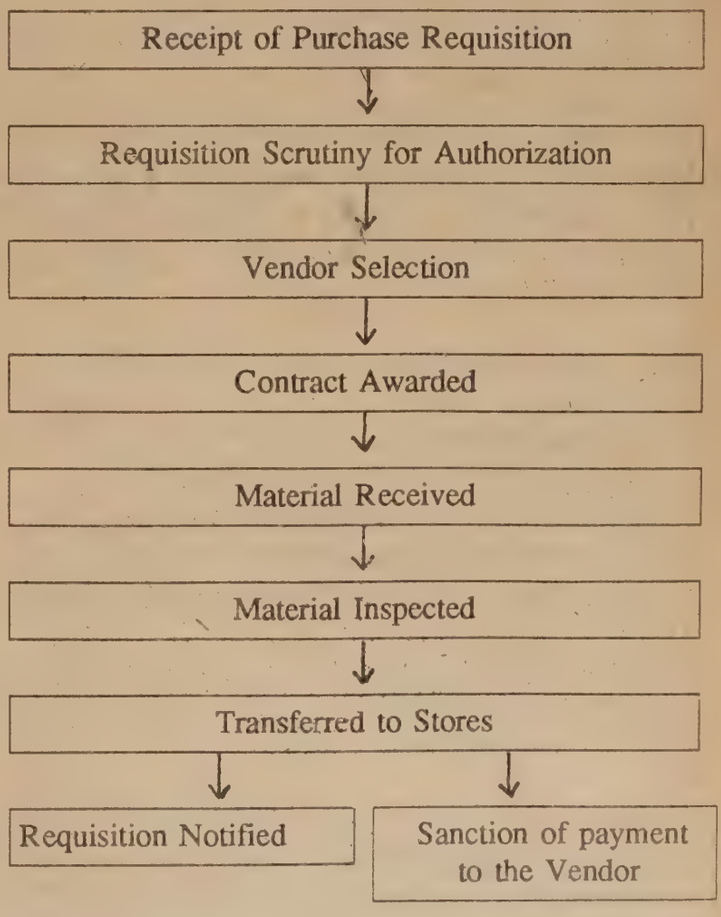
Next point that falls in line is the "Suppliers Selection". Supplier is selected on the basis of: (a) price; (b) quality and (c) delivery schedule. Past experience with the suppliers is of immense value in this respect. Next, we have "fixing of the delivery dates" and "signing the purchase contracts".

On receipt, material is checked for its quality, quantity and for condition of its packaging by the receiving authority. When material is found "O.K." the suppliers invoices are first sent to purchasing manager and from there to the head of the department who has requisitioned the material. The goods, if found upto the mark are next placed in stores. They can add to the stocks (inventory) till picked up for use by the ordering authority.

After the contract is fulfilled, the purchase department refers to the suppliers invoice. Adjustments are made in it against any discounts agreed upon earlier. It is then processed for payment.

Thus the "purchasing cycle" extends from the receipt of the purchase requisition from the ordering department to the stage at which material is made available as per the order to the requisitioner and the payment is sanctioned to the vendor.

These steps in the purchasing cycle can be briefed as follows:



Purchasing Function

From the above discussion "purchasing" appears to be a straight forward process, simple and without any complica-

The first three parts of this series i.e. Part 1: Introduction; Part 2: Functions of Management and Part 3: Purchasing Management have already been published in *CHEMICAL WEEKLY* on 29th September 1988, 18th October 1988 and 15th November 1988 issues respectively. -- Editor.

cations whatsoever. But for an experienced purchasing agent this simplistic notion is not acceptable. He views "purchasing" in terms of "Purchasing Function" where in several factors interact. In order to make "Purchasing" truly successful the interrelationship and interdependence of these factors must be clearly known and understood. No single factor can be considered in isolation but all the relevant factors should be considered together as parts of a single system. We shall consider each of these factors one by one.

Purchase Requisitions

As discussed earlier, the starting point is receipt of purchase requisition from any of the functional departments of an organisation. These requisitions themselves fall under three broad categories:

a) Standard purchase requisition.

b) Travelling purchase requisition.

c) Bill of materials.

a) Standard purchase requisition: Here one thing should be noted that there is no standard requisition form, common to all the organisations. Each organisation can develop its own "standard form". However, this form must inform on following points.

1. Identification number of purchase requisition.
2. Ordering department.
3. Date of ordering.
4. Account to which it should be debited.
5. Items, their description and their quantity.
6. Date, when items are required.
7. Identification number of the corresponding purchase order.
8. Delivery date.
9. Instructions for carriers.
10. Vendors name.

b) Travelling purchase requsition: This is a device to shorten the purchasing process to obtain recurrently needed items and standard material. It is in the form of a card maintained all the time by the inventory control section or stores. For each item needed recurrently a separate card is maintained all the time by inventory control section. Moment the stock levels sinks below the reorder point, the card is fast forwarded to the purchasing section. Since such card furnishes all the information corresponding to the item, its quality, potential vendors, "where used", "quantities to be ordered" etc., the purchasing section finds no difficulty in preparing a purchase order. This dispenses with the process of sending new purchase requisitions every time an order is placed. It saves time, stationery, man-hours etc.

Generally a coloured slip is attached to the card by t inventory control personnel. This signals that the particul item has been requisitioned. After placing the correspon ing purchase order, the purchase section returns this card inventory control. On receipt of the items, the colour slip is removed and the process can be repeated when th stock level once again drops below reorder point. In th system, the "purchase requisiton" in the form of the card tra vells from stores to purchase section, hence the name tra velling purchase requisition. This method provides a ver convenient way of travelling purchases of recurrently neede items.

c) Bill of Materials: Bill of materials enlists those item which go to make one unit of the final finished product tha the firm manufactures. Such a list is generally prepared simul taneously with the engineering drawings needed for the manufacture of the item. Thus the bill of materials shows how much of each material is required to manufacture one unit of the final finished product. So, when it is sent along with upcoming manufacturing programme, the purchasing department, can easily make out its purchasing order. The size of the purchase order for each item can be worked out by multiplying production programme quantity by bill of materials. Obviously the need to type out numerous purchase requisitions for items needed for manufacturing is ruled out completely.

Purchase requisition is the first requirement to place a purchase order, the second being product specifications.

Product Specifications

Each item has certain definite characteristics and features. Detailed description of such characteristics and features come under product specifications. They serve three main purposes.

1. Detailed description of the items to be ordered is furnished.
2. Supplier can cater to the exact needs of the purchaser.
3. On receipt, items ordered can be verified easily.

Several types of specifications are in use today. They describe the items and at times, grade them also. Some of the common ones are enumerated hereunder:

1. Blue print or Ammonia print: It is an engineering drawing and is extremely useful where rigid tolerances or a high degree of mechanical perfection is needed.

2. Material Specifications generally point out physical and chemical properties needed in an item. Material specifications are normally furnished for items like metals and alloys

nickel, stainless steel, aluminium, etc.), pharmaceuticals, oils, ats, soaps, waxes, paints, pigments, etc.

3. *Market grades* describe quality of commodities like wheat, rice, jowar, bajri, cotton, jute, tobacco etc. These market grades are established by Government bodies and trade associations.

4. *Commercial Standards:* They include items which are made in mass production. In fact mass production is possible because of commercial grades. Such items have standard specifications established by engineering societies, trade associations or Government bodies and include all nuts, bolts, electrical plugs, sockets, motors etc.

5. *Performance Specifications:* These specifications describe an item on the basis of its performance i.e. on the basis of "what the item is supposed to do"? What is it meant for? "What is its function?". The supplier is informed only about the performance of the item intended and not in terms of how it is made and what are its contents. The item should pass tests which show its performance while in service. Performance specifications are meant for complex systems where reliability of function is of utmost importance e.g. instruments and equipments used in space research, aeronautics, military, etc.

Here one point should be noted. If it is not possible to describe a product adequately by one single specification, a combination of specifications can be used. In case the product is a deviation from established standards, as is the case with a new product, then it is for the engineering department to work out in detail its particular specification. However, such a situation is economically not feasible for small-lot buyings, low-cost items and small-lot buyings are carried out most economically by relying on brand names or trade names of reputed organisations.

So the purchase department gets all the information discussed above under purchase requisitions and product specifications from the "ordering" or "using" department of the organisation. It then forms its own policy of purchase, looking into the restraints imposed upon it. We therefore, next look into the restraints under which purchasing department works and next, the type of "purchase" it decides to make looking to the economic advantage of the organisation.

PURCHASE RESTRAINTS

Restraints on "Purchase Department" comes in various forms. The most important amongst them are restraints on available resources. These restraints on resources can be in the form of limitations on the funds sanctioned, availability of machine hours, man hours, storage space etc. Then there are other management policies within the framework of which the purchase department has to function, since it cannot take independent decision but the decision has to be in line with the management policies framed for the working of organisation as a whole. Then there are legal aspects. Every transaction the company makes must fit in the legal formalities. "Purchase" is also guided by market conditions e.g. whether the item ordered is in short supply or in abundance in the market. We shall consider each of these restrictions one by one:

1. Restraints on Resource Availability

The most deciding resource limitation comes in the form of financial restrictions. Purchase department has to function in accordance with the cash flow and working capital sanctioned by the finance department. Even if an item that is often required is available in the market at low price because of a dip in its market price, if the sanctioned finance is not sufficient, the purchase department has to forego such opportunities in the longer interest of the organisation as a whole. Again, "purchase" cannot buy items more than that can be accommodated in the space sanctioned for the item in stores. Materials handling in the form of equipments and man-power can also bring about restrictions on the amount of purchases that can be made.

2. Market Situation

These are strongly influenced by tilt in supply and demand situations, e.g. if an item is in shortage in the market and if the organisation requires it badly then reliability in supply plays a more advantageous role than mere low-price supply which is less reliable. But when the supply is adequate or more than its demand in the market, the above policy may not be suitable, perhaps low-price source may be a better choice. Purchasing is therefore said to be often influenced by what is known as "situational dynamics".

3. Legal Restraints

Purchase contract is a legal document and in order to make its clauses enforceable if and when needed it must fit in the frame work of the legalities prevalent in the country. Otherwise, one may loose legal protection. So no company can go in for a contract which is illegal, however lucrative it may be.

4. Policies of the Management

Purchase department has to consider this factor as one more form of restraint. The best example is that of centralised or decentralised purchase. If the organisational policy is to go in for centralised purchase, then for no advantage purchase

department can deviate from this master policy. Weakness of centralised purchases is that they are highly rule-bound and hence quite sluggish. The problem arises when the need is urgent. Centralised purchasing is however, most welcome for multiplant organisations. It is economical when an organisation needs related items in different locations. It develops better specialised skills of purchasing. It also can take advantage of quantity discounts and cash discounts offered by the supplier, since orders when consolidated are in a better position to take advantage of these offers. It also establishes better control on inventory investment. There are less duplications of purchase efforts. Again for several plants of an organisation working at different places, the quality of raw material supplied is uniform.

Cultural differences

When moving within the society of the same or similar culture these influences remain unnoticed. However, they do surface up when dealings are with foreign countries. The typical differences are with regard to the attitude towards assigned work. Whether it is taken seriously and is carried out fast or is taken for granted and is carried out leisurely. Approach towards settlement of contract also comes within these cultural influences. Others, being methods adopted in paying wages and salaries, whether weekly, fortnightly or monthly. Working hours may also differ.

PURCHASE PROCEDURES TO BE ADOPTED

After looking to the above restraints, purchase department has also to consider which type of purchase order will fetch better economical advantage to the organisation. It goes without saying that the procedure adopted for purchases of high volume continuously used items has to be different from one time costly purchases. Items ordered are therefore categorised in four different classes and for each class, purchase procedure adopted is different to suit the economic advantages. We will consider these classes herebelow:

1. Continuously used items

Blanket purchase order or open-end purchase order is employed to buy such items of continuous usage for which the demand is quite predictable. Here the supplier gets the requisition directly from the user department of the organisation. It is not processed by the purchasing department. The purchasing man negotiates the basic contract for a fixed period, say an year. However, quantities, delivery dates and prices are kept open. As per its need production control department sends notification to supplier as regards delivery dates and size of the consignment. If the price is not indicated in the basic contract then it is the price in force when the quantity is purchased. Thus individual purchase orders are not written separately for each purchase. The main advantage of this system is that substantial discounts are generally obtained from the supplier; since such discounts are based on the total annual purchases. Again, purchasing becomes a routine job and therefore can be handed over to less technically knowledgeable personnel. The result is the time of top-brass of the purchasing department is saved which they can divert for more important duties that need greater attention.

2. Items ordered on one-time basis

These include purchase of special machines and capital goods like computers, vehicles, spacecraft etc. Such items are purchased once in a way. Further they involve huge investment. Hence several months planning and evaluation is needed. Often the tenders are called for from the bidders.

3. Low-value items

These are just on the opposite side of single order purchases indicated in 2 above. Since the items here are of low-value, quite often the process cost of such purchases if normally carried out would be more than the cost of the items purchased. Such items are therefore purchased by open-end purchase orders or from petty cash accounts to bring down the cost of purchases.

4. Items purchased in normal manner

Items which do not fall in any of the above three categories come under "normal purchases". These are carried out by the simple "purchasing cycle" method already discussed.

(To be continued)

Saving our Skins

T.P.S. RAJAN

The development of an oxygen rich atmosphere, with its ne layer, was a precondition to the development of multi ular plants and animals and all life forms on the air, land sea have evolved under this shield. Therefore a large den of proof is required of those who say that the com- tion of the atmosphere can be changed with impunity". s states the U.S. National Academy of Sciences in its rt to the National Research Council on the "Long Term ldwide effects of Multiple Nuclear Weapons Detonation" 1975).

World wide emissions of chlorofluorocarbons (CFCs) aten to deplete the upper atmosphere ozone -- the very tance which shields us from potentially harmful ultra- et radiation (UV-B) and thereby pose a danger to human ival.

aving our Skin is the apt and eloquent title for the joint ect report of the Environmental Policy Institute and the tute for Energy and Environmental Research dealing with technical potential and policies for the elimination of ne depleting chlorine compounds. The authors of this rt (Arjun Makhijani, Annie Makhijani, Amanda Bukel) n the research faculty of the Institute of Energy & Envi- nental Research based at Maryland, USA.

very environmentalist talks today of the Antarctic ozone : there may soon be an Arctic hole as well. Every Spring the last few years a vast region over the Antarctic -- rea of the size of China has become depleted of 50% s ozone content. It is reasonably certain that this enor- s hole is caused in a large measure by the release of man e chlorinated compounds such as CFC's.

is well known that most of the ultra violet radiation from sun never reaches the earth's surface since its energy is rbed in the ozone rich zone of the atmosphere. The osphere contains very little ozone, the ozone layer at any cular spot may not be more than 3 mm thick. One can alize a picture of the planet having a 3 mm thick ozone to filter the ultra violet radiation. Stratospheric ozone nstantly produced and destroyed as a result of certain ochemical reactions. Chlorine from the CFC is not used the reactions which depletes the ozone. It acts as a cat- , one atom of chlorine destroys thousands of oxygen mol- es before it gets neutralised.

ethyl chloroform, carbon tetrachloride and other chem- act in a similar fashion although the quantities of chlor- ine involved are somewhat smaller.

CFC's enter our daily lives in many direct and indirect ways. CFC-11, CFC-12, CFC-114 and CFC-115 are used as the fluids for the cooling system of refrigerators, freezers, car and truck air conditioners.

Solvents: CFC-113 is used, usually in combination with other chemicals as a cleansing agent for electronic circuit boards.

Aerosols: CFC-11 and CFC-12 are used as aerosol propellants mostly in Europe and Japan. USA, Canada and Sweden have prohibited such use.

Foam Production: CFC-11 and CFC-12 are used to produce soft foam (furniture, bedding and car seats, packaging material and insulating filler for rigid foam).

Sterilisation: CFC-12 is used as the delivery medium for the sterilant ethylene oxide which is used for sterilising hospital equipment, and spices and even books.

Fire fighting halons containing bromine which have a high ozone depletion potential are used in fire fighting equipment of a centralised variety.

The main difference between the use of CFC's in the US and in other countries is that their use as propellants has practically been phased out in the US while they constitute the largest single use elsewhere. Their use for mobile airconditioning is the single largest outlet in the use to a lesser extent in Japan while it is relatively unimportant in other countries.

The per capita use of CFC-11 and CFC-12 varies between 0.60 to 0.85 kg/year in EEC countries, United States, Australia; Japan records 0.48 kg, Kuwait 0.6 kg and Sweden 0.43 kg. India's consumption is the lowest at 0.001, China 0.02, Malaysia 0.09 and Korea 0.09.

Combining US and world estimates, roughly one billion kilograms (or one million tonnes) of CFC's are stored in existing refrigerators, chillers, air conditioners etc. This is equal to the worldwide use of all regulated CFC's for all purposes in 1985. A 3% decrease in global ozone would produce roughly a 6% increase in biologically effective UV-B radiation. Such an ozone depletion is estimated to produce the following effects:

1. Roughly four thousand cases and one thousand deaths every year of malignant melnoma will occur, concentrated in areas of North America, Europe, including the Soviet

Union, Australia and New Zealand. Such cases will occur in all countries where the inhabitants are light or fair skinned.

2. About 200,000 cases per year of other skin cancers in the same areas.

3. Approximately 400,000 cases per year of cataracts, which may lead to blindness.

4. Severe damage is anticipated to plants and animals and all forms single cell aquatic life forms and marine plankton.

5. It would become increasingly difficult to grow food crops and livestock would have to graze at dusk or night assuming that there is any green grass still growing.(!?)

6. Ozone depletion will cause global warming with significant rise in sea levels and flooding out of low lying areas and a huge loss of cultivable wet lands.

7. Since phytoplantation and zoo plantation play crucial roles in complex ecological food webs, damage to them may have important ramifications for all ocean life.

8. Large persistent declines of stratospheric ozone will produce catastrophic effects for life on Earth. The effects of such a plethora of calamities may be comparable to those from a nuclear holocaust, except that it would not have a sudden and horrendous destructive effect affecting hundres of millions of people in a short period -- rather it is comparable to the ill effects of a nuclear bomb on a long range evaluation.

Alternatives:

The most promising substitute chemical for CFC's to date is HFC 134a. This chemical has refrigerant properties resembling CFC-12, it is not inflammable and contains no chlorine. It is classified as having zero ozone depleting potential and its green house effect loss is assessed at less than 10% of that of CFC-12.

Refrigerators which use gaseous helium have been used in space and military applications for many years. Their application to household refrigeration and air conditioning has been prevented by the high cost of making critical parts. The Peoples Republic of China, whose programme for improving the quality of life of its people, provides for millions of refrigerators, are investing heavily in the manufacture of 9 milliion helium cooled refrigerators.

It is feared that CFC consumption in the third world increase to the point of defeating progress on the lim of CFC emissions by the industrialised countries. If th recognition by the industrialised countries that they have the main source of the problems and if they take appro steps to curb emissions drastically in the immediate fu then cooperation with the third world will be much e to achieve. This is not in order to affix blame but to enc age the allocation of the world resources for aiding the t world to move away from CFC's.

For the third world countries with technological and in strial infrastructure such as China, India and Brazil, the oz crisis is both a challenge and an opportunity. They are position to develop alternative technology to replace C China in fact hopes to export a good percentage of the p posed small helium cooled refrigerators. It is for the We ern countries to ensure that the Third World countries not be compelled to solve a problem they have not creat

Reduced use of CFC's will produce net economic be efits -- at least no additional costs to many industrial use and other consumers of CFC's. This is quite apart from t benefits to the environment. Current careless use of CFC is comparable to the use of energy before 1973.

The report estimates that total cost of an 80 per cent redu tion in CFC use over the next 10 years including the so calle transfer costs to be less than $ one billion per year (1985 do lars) for the US which works out to about $1 per household per month. On this basis the worldwide costs will be aroun $3 billion.

The well documented report does not predict a doom day. This report discusses the Montreal Protocol signed b 24 countries in September 1987 and points out that the Pro tocol's restriction may not be adequate to protect the plan from severe ozone depletion.

The distinct merit of this book is the fact that it deals wit a major global threat which concerns human survival in simple, direct, thorough and systematic manner and hope fully concludes that "with appropriate efforts and policies the production of CFC's can almost be totally phased ou by 1995 without serious economic depletion and to that ra of hope, humanity will cling".

Save the ozone layer to save our skins may perhaps be ou apt resume of this report.

OTLIGHT ON INORGANIC CHEMICALS

Dicalcium Phosphate

B.A.V.K. SHARMA*

roduction

Dicalcium phosphate is known by various names: dibasic ium phosphate, secondary calcium phosphate, calcium rophosphate, calcium hydro-ortho phosphate, brushite, sphors, monetite etc.

There are 187 phosphate minerals mentioned in Dana's tem of minerology. Brushite, hydrated dicalcium phos- te, having the generic base formula $CaHPO_4.2H_2O$, all slender monoclinic prisms, colourless to yellow, occurs West Indies. Anhydrous dicalcium phosphate $CaHPO_4$ ed Monetite is also found in West Indies.

There are various grades of dicalcium phosphate and ong them the following grades are important:

. Fertiliser grade, 2. Animal feed grade, 3. Pharmaceut- & cosmetics grade, and 4. Luminescent grade.

There are other various uses for dicalcium phosphate such abiliser for plastics, dough conditioner, yeast food, antacid glass industry requiring specific grades.

mistry

he preparation of pure calcium ortho phosphate is dif- lt due to the following reasons:

alcium ortho phosphates, mostly all of them, undergo olysis in an aqueous solution as follows:

$$H_2PO_4)_2H_2O + xH_2O \longrightarrow CaHPO_4 + H_3PO_4 + (x+1)H_2O$$

$$aHPO_4 + yH_2O \longrightarrow 2Ca_5(PO_4)_3(OH) + 4H_3PO_4 + (y-2)H_2O$$

$a_5(PO_4)_3(OH)$ is knowns as hydroxylapatite or "trical- phosphate" and forms insoluble fluorapatite even with s of fluorine.

Then lime is slowly added to phosphoric acid, monocal- phosphate precipitates around pH 4 and further addi- of lime decreases the pH.

solution of calcium chloride may form various com- es if added to diammonium phosphate solution:

$$H_4)_2HPO_4 + 3CaCl_2 + H_2O \longrightarrow Ca_3(PO_4)_2 + H_2O + 4NH_4Cl + 2HCl$$

$$H_4)_2HPO_4 + 5CaCl_2 + H_2O \longrightarrow Ca_5(OH)(PO_4)_3 + 6NH_4Cl + 4HCl$$

$$6(NH_4)_2HPO_4 + 8CaCl_2 + 6H_2O \longrightarrow Ca_8H_2(PO_4)_6\ 6H_2O + 12NH_4Cl + 4HCl$$

The complexes are: hydrated tricalcium phosphate, hydroxylapatite and octa-calcium phosphate.

Dicalcium phosphate is prepared in the laboratory as follows:

1. Dicalcium phosphate dihydrate is prepared by ammoniacal calcium chloride solution added to diammonium phosphate at pH 5 and 30°C or by reacting a hydrated lime slurry with 30-40% H_3PO_4 at 25°C.

2. Dicalcium phosphate anhydrous can be prepared by dehydrating $CaHPO_4\ 2H_2O$ by steam at about 135°C or reacting calcium oxide in excess phosphoric acid at 100 to 110°C.

Properties

Dicalcium phosphate is a white, tasteless, crystalline powder; odourless, soluble in dilute nitric, hydrochloric and acetic acids; insoluble in alcohol; slightly soluble in water. Specific gravity (Hydrate) 2.306; loses water at 109°C.

Fertiliser grade

Dicalcium phosphate, fertiliser grade is a phosphatic fertiliser containing around 40% P_2O_5 -- citrate soluble. This fertiliser is used all over the world but not in India. The reason may be the Indian farmer wants to use only water soluble fertiliser or the apathy of the fertiliser industry in not making this fertiliser available to farmers. This fertiliser can be made using rock phosphate of low grade quality and using hydrochloric acid, an easily available by-product of chloralkali industry. This fertiliser is two and a half times richer in P_2O_5 content than that of the single super phosphate.

Dicalcium phosphate is produced by using roasted rock phosphate, hydrogen chloride gas, lime-stone powder and hydrated lime.

Rock phosphate is pulverised to min. 95% passing through 200 mesh, roasted and made into a slurry with wash-liquor of the previous batch. Hydrogen chloride gas is passed into the slurry. The sludge is removed and the clarified liquor is treated with lime-stone powder to neutralise the excesss hydrochloric acid and also to neutralise the first hydrogen ion of its free phosphoric acid. Then the dicalcium phosphate is precipitated by using hydrated lime. It is washed, dried and pulverised to get 40% citrate soluble phosphorous pentoxide.

aging Director, Sharma Consultancy Services (Madras) Pvt. Ltd., 11, treet, 3rd Main, C.I.T. Extension, Nandanam, Madras 600 035.

The process involved is represented by the following equations:

$Ca_3(PO_4)_2 + 6HCl \rightarrow 3CaCl_2 + 2H_3PO_4$
$2H_3PO_4 + CaCO_3 \rightarrow Ca(H_2PO_4)_2.H_2O + CO_2$
$Ca(H_2PO_4)_2.H_2O + Ca(OH)_2 + H_2O \rightarrow 2(CaHPO_4.2H_2O)$

The calcium chloride solution is disposed of as waste if no market exists for the same. The flourine gases if evolved in the first reaction are scrubbed and neutralised to get sodium silicofluoride.

To manufacture 1 MT of fertiliser grade dicalcium phosphate the following are the requirements:

Rock phosphate (28% P_2O_5)	1.50 MT
HCl (100%)	0.90 MT
Lime stone powder (98%)	0.38 MT
Hydrated lime (95%)	0.29 MT
Power	45 KWH
Furnace oil	40 L

Animal feed grade

Animal feed grade dicalcium phosphate contains around 19% P and 23% Ca. Fluorine content varies between 0.1 to 0.2%. This product is used in cattle and poultry feeds as a source of phosphorous and calcium minerals. The major source of this grade of dicalcium phosphate in India is available as a by-product of the glue and gelatine industry. There is no growth in the glue and gelatine industry for nearly a decade and as a result there is an acute shortage of this product today and the cattle feed industry is in deep trouble. Defluorinated wet process phosphoric acid of concentration 54-55% P_2O_5 is reacted with lime stone powder of 98% purity of particle size 95% through 200 mesh, to get dicalcium phosphate which is dried and pulverised. The chemical reactions involved are represented as follows:

$CaCO_3 + 2H_3PO_4 \rightarrow Ca(H_2PO_4)_2.H_2O + CO_2$
$CaCO_3 + Ca(H_2PO_4)_2H_2O + 2H_2O \rightarrow 2(CaHPO_4.2H_2O) + CO_2$

Requirements for 1 MT of animal feed grade dicalcium phosphate manufacture are as follows:

Phosphoric acid (54% P_2O_5)	595 kgs
Lime stone powder (98%)	650 kgs
Furnace oil	55 L
Power	85 KWH

Pharmaceutical grade

Human feed grade dicalcium phosphate is used as a source of phosphorous and calcium in fortified food. Pharmaceutical grade is used in the manufacture of tablets and gelatine capsules; also used as a protective base for vitamins. Cosmetic grade is used in the manufacture of tooth powder and tooth paste as a stabiliser. Sufficient capacity of these grades is already established in our country. The specification pharmaceutical grade dicalcium phosphate are as follo

Assay	Min 98%
Bulk density	0.7 g/ml to 1 g/ml
Cl^-	0.25%
SO_4^{2-}	0.5%
As	Less than 10 ppm
Heavy metals	Max. 30 ppm
CO_3^{2-}	Absent
Loss on ignition	24.5-26.5%
Loss on drying at 105°C	Max. 3%
HCl insoluble matter	Max. 0.1%

Dicalcium phosphate is obtained by reacting phospho acid made from thermal process with slaked lime of pure q ity in the reaction:

$H_3PO_4 + Ca(OH)_2 \rightarrow CaHPO_4.2H_2O$

Dicalcium phosphate manufactured beforehand having grain size 95% through 100 mesh is introduced into a m ling machine having a capacity of 3000 litres. The mulli machine is started by charging 4100 kgs/hour of 55% P_2 phosphoric acid and 2440 kg/hour of slaked lime contin ously. To cool the products reaction water is circulat through the jacket. Dicalcium phosphate is obtained at t rate of 5500 kgs/hr. The product obtained contains 15% weight and is dried by a fluidised bed drier.

Luminiscent grade

Luminescent grade dicalcium phosphate is used in the tu ular envelop of low pressure mercury vapour fluorescent ele tric discharge lamps to provide highest possible brightnes The specifications of this grade are as follows:

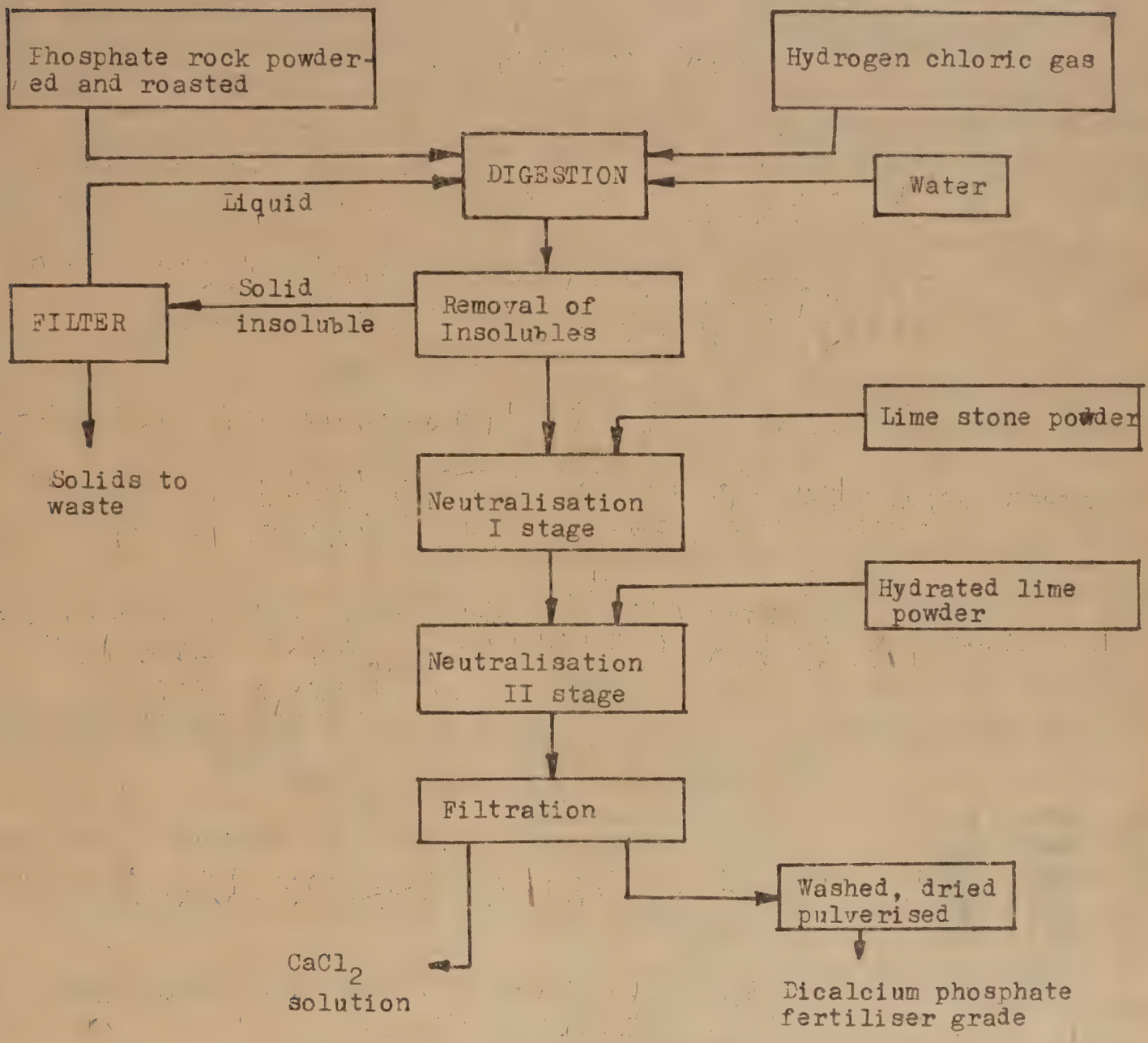
Assay (as $CaHPO_4$)	Min. 99.5%
Molecular ratio Ca:P	1:1.03
Water	Max. 0.5%
Iron	Max. 0.0005%
Heavy metals (as Pb)	Max. 0.001%

There is a good scope for this grade of dicalcium pho phate in the country.

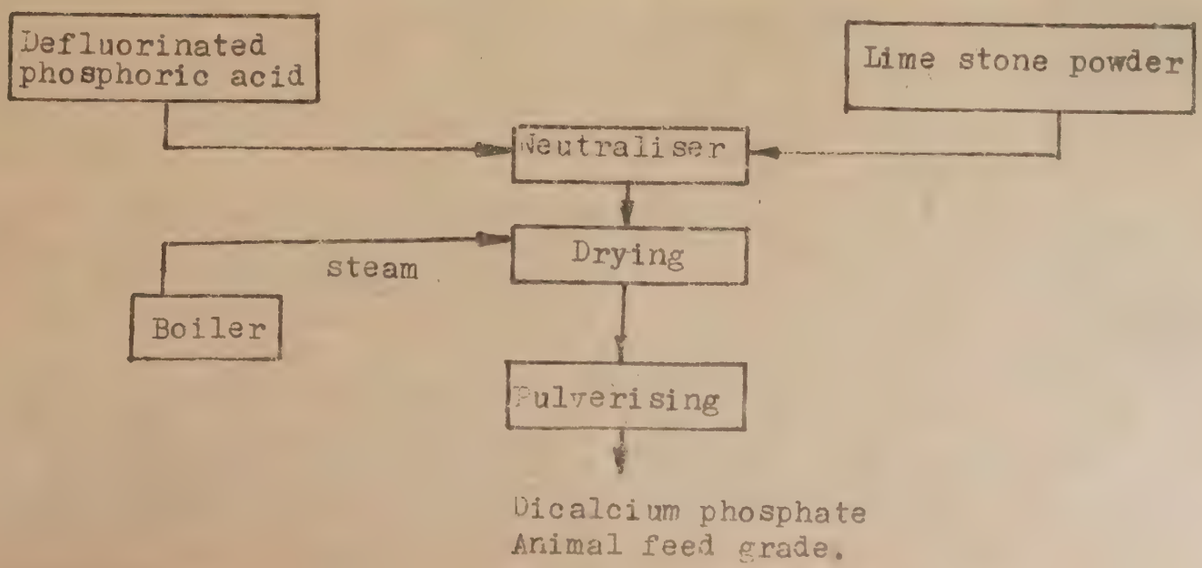
Diammonium phosphate solution of concentration 15.84 and pH 6.85 is prepared by pure diammonium phosphate cry tals, pure water and pure phosphoric acid; calcium chlori solution of concentration 13.32% and pH 1.4 using pure ca cium chloride solution and pure hydrochloric acid.

The two solutions in stoichiometric quantities are forc into droplets of 100 microns size and intimately mixed b simultaneously spraying the solution into one another a allowing the individual droplets to react. The slurry obtain is washed, dried and pulverised.

Block-flow diagram for manufacture of fertiliser grade DCP



Block-flow diagram for the manufacture of animal feed grade DCP



The chemical reaction involved is represented as follows:

$$(NH_4)_2HPO_4 + CaCl_2 + 2H_2O \longrightarrow CaHPO_4 2H_2O + 2NH_4Cl$$

It is essential to control the concentration of reactant solutions, the pH of initial as well as final slurry and also the degree of atomisation in spraying of dicalcium phosphate without the impurities like monocalcium phosphate, hydroxylapatite, tricalcium phosphate and octa-calcium phosphate which are likely to be formed.

The determination of the purity of the dicalcium phosphate as indicated by differential thermal analysis and the lamp test to know the luminosity are essential.

Conclusion

The fertiliser grade dicalcium phosphate industry can be set up by such chlor-alkali industry who find the sale of chlorine difficult. Calcium chloride disposal is easy if such industries are coastal based. Even if the availability of hydrochloric acid is difficult the calcium chloride can be used to obtain hydrogen chloride which can be recycled. Development of such a technology may be difficult but definitely not impossible. Even if this fertiliser is produced farmers have to be educated regarding its usage which may be a time consuming effort. The initiative has to come from the government by offering suitable subsidy as is done for all fertilisers. start with a few industries of capacity 100 TPD of dicalc phosphate can be thought of. A beginning has to be don this direction.

Regarding animal feed grade dicalcium phosphate immediate need is to set up atleast four industries of size TPD so that the crisis brewing in the cattle and poultry f industry is eased. The rock phosphate prices are gallop up and the cost of production of dicalcium phosphate by r phosphate route may be higher than that produced from b by the glue and gelatine industry. If once the price struct of dicalcium phosphate is sorted out then there will b steady growth of this industry.

Manufacture of dicalcium phosphate of high purity required for human consumption, pharmaceutical and c metic industries involves the usage of thermal process ph phoric acid. The energy requirement to manufacture this a is quite high. Now there are various methods of purificati of wet process phosphoric acid and it is better to change ov to wet process phosphoric acid to be cost effective. Dica cium phosphate required by lamp industry can also adopt process based on wet process phosphoric acid and few indu tries with a capacity of 10 TPD are required at present meet the demand.

Science Briefs

R & D INTENSIFIED ON SUPER-CONDUCTIVITY

If one were to vote for the best produced annual report among the reports for the year 1988-89 from all the departments of the Government, the annual report of the Department of Science and Technology (DST) would be a clear winner. The high production quality appears to be the result of the establishment of a new unit called the Office of the Public Affairs within the DST. However, it must be remarked that the use of English leaves much to be desired.

An attractive close-up of the magnetic levitation (the so-called Meissner effect) in the Yttrium-based (1-2-3) ceramic oxide high-temperature (high-Tc) superconductor, developed at the Indian Institute of Technology (IIT), Madras, adorns the front cover. This is most appropriate as under the Rs. 15-crore National Superconductivity Programme (NSP) of the DST the success of the IITM project in developing the process for bulk synthesis of this yttrium-barium oxide compound marks a major achievement. This technique could lead to a production base for the compound.

According to the annual report, the Project Management Board (PMB) on superconductivity initiated the first phase of the NPS (1988-89), which involved about 55 groups and 30 institutes/organisations. The report has stated that research and development work was being intensified with emphasis being given to the equipment and the programme content in the lead organisations such as the Bhabha Atomic Research Centre (BARC), Trombay, the Bharat Heavy Electricals Ltd. (BHEL), the Indian Institute of Science (IISc), Bangalore, the IITs, the National Physical Laboratory (NPL), New Delhi and the Tata Institute of Fundamental Research, Bombay. Many university groups that are involved provide the broad base to the programmes and for manpower generation.

Encouraging results

Many encouraging results have been claimed in different high-Tc materials including thallium compounds. Apart from the work at the IITM already mentioned, other notable work has come from the TIFR, the BARC and the IISc. The most significant among these, in terms of original ideas and new concepts, would be the TIFR-BARC team's investigations on the magnetisation and critical magnetic field properties of high-Tc superconductors. A group at the TIFR has also succeeded in thin film growth of the 1-2-3 type of compounds. The IISc team led by Prof. C.N.R. Rao has investigated several new oxide materials including nickel-based copper-less superconductors.

The progress of the various projects under the NPS, both under basic research category and applications category, were reviewed on March 23-24 at the TIFR by the PMB. It was learnt that, of the Rs. 15 crores earmarked for the three-year period, the committed expenditure amounts to over Rs. 11 crores. The NPS's budget for 1988-89 had been Rs. 5.5 crores and the budget for 1989-90 is Rs. 7 crores. The bulk of this money, has gone towards the purchase of sophisticated equipment most of which is yet to arrive.

Lack of equipment

The general impression given by the members of the PMB after the March meeting had been that it was too early to say whether there had been any real progress in the NSP or not mainly due to the fact that lack of equipment had slowed down much of the activity. For the same reason the review could not also evaluate projects to the extent of being able to suspend or end some of the projects and increase support to some. The same level of funding w be maintained this year too, and as t Chairman of one of the Task Forc said: 'Ask me at the year end.'

Efforts of the DST towards develop ment of technology under its thre schemes of engineering and technology developments of instruments and tech nology missions and systems have pro duced some new results, according t the annual report. Notable among them is the contract with the Centre for the Development of Telematics (C-DoT) for the development of a parallel processing system (PPS) with a funding of Rs. 4 crores. The PPS is a transputer-based machine linking 256 processors in parallel with an envisaged capability of 640 million floating point operations per second (MFLOPS) and peak integer rating of about 1000 million instructions per second (MIPS). The prototype with four processors is expected to be ready by the end of this month. The complete machine is expected to be ready by the year-end.

New products

Other technological products include an indigenously developed pin-on-disc machine for investigating wear characteristics of materials; an industrial wind tunnel set up at the Roorkee University for investigation of wind effects on civil engineering structures; design and fabrication of a hydrocephalic shunt; and the development of floor reaction orthosis for polio patients. Six instruments have been developed and made ready for commercialisation. These are grain moisture analyser, scanning electron microscope, infrared spectrophotometer, digital tide gauge, portable pH meter and seismograph.

The Sree Chitra Tirunal Institute for Medical Science and Technology, Trivandrum (an institution under the DST) has also planned for the pilot production of the hydrocephalus shunt. This is also likely to be taken up by the new facility at the institute's biomedical

chnology wing, a strategy which has ready paid off with regard to other oducts like the Chitra oxygenator and rdiotomy reservoir. The institute is lso believed to have made significant rogress in the area of polymers for edical applications and the develop- ent of delivery system for medical pplications of the neodymium-YAG aser.

TAH FUSION CLAIMS ISPUTED

While Utah University which claimed uccess for fusion in a jar has got $5 illion to continue the research, the rest f the scientific community has begun regard the claims as totally nfounded.

Researchers from the California Insti- ute of Technology and Massachusetts nstitute of Technology, who have car- ied out their own experiments to prove r disprove the Utah claims, are the atest to dispute the Utah claims.

They said that they had duplicated the Utah experiment and found ordinary xplanations for all the phenomena that he Utah group had taken as "evi- ence" of a most extraordinary form of uclear fusion.

Mr. Harold Furth, head of the fusion rogramme at Princeton University, said fter hearing the California and MIT esearchers at the American Physical ociety: "the physics community will alk away from this completely con- inced and think there is no further ork to do".

The chemists, however, are hoping at Utah's B. Stanley Pons and South- mpton University's Martin Fleisch- ann are right.

In debunking the Utah experiments, Nathan Lewis of Cal Tech said that he as convinced on the basis of his roup's experiments, which got the ame results claimed by the Utah group, that it all could be explained as a normal processes in a fuel cell, a conventional energy-producing device and not fusion which theoretically can give mankind an unlimited, cheap and safe power supply.

COLD FUSION STARTS RUSH FOR PALLADIUM

Though cold fusion is still a topic of hot debate, the relatively unknown metal palladium has been shot into centre stage of the energy business.

Experts say that uranium will lose its supremacy to palladium once cold fusion becomes a reality. Palladium is one of the metals inside which American scientists claimed to have produced nuclear fusion with release of heat energy.

The nuclear reaction is still to be confirmed hundred per cent, and it will be several years before cold fusion reactors can be commercially built. But the palladium rush has already begun.

Palladium is a rare and expensive metal. A 1,000 MW cold fusion reactor will need in excess of 300 tons of palladium. At the current market rate of $4 million per ton, the cold fusion reactor will cost $1,500 million.

Since cold fusion reactors will be relatively easy to build, developing countries can build them. Their main hurdle would not be technology, but the availability of this metal whch is scarcer than uranium.

The world's major reserves of palladium are in the Soviet Union and South Africa, which supplied 98 per cent of the world's palladium in 1988.

Many nations will not like to rely on South Africa and the world has only a small amount of recoverable reserves of palladium. India imports all its palladium. Cold fusion experiments claim that palladium can be substituted with titanium, large deposits of which are distributed throughout the world. The United States is the world's largest titanium producer.

India has a 100-tonne titanium pilot plant in Hyderabad and a bigger plant is being proposed in Kerala. The two successful cold fusion experiments so far carried out in India used titanium instead of palladium.

NPL DEVELOPS THIN FILM SOLAR CELLS

Scientists at the National Physical Laboratory (NPL) have succeeded in developing thin film amorphous silicon solar cells, using indigenous technology.

These cells can be used in transistor radios, watches, cassette players and calculators.

The cells developed by NPL researchers have been found to have an efficiency of 11 per cent, comparing well with the best produced in Japan and the US.

Unlike crystalline silicon cells which require strong sunlight, thin film amorphous silicon solar cells are activated by "blue region" of the light -- the room light.

The NPL technology for producing these cells will be tried out in the pilot plant being set up for this purpose by Bharat Heavy Electricals Ltd. (BHEL) on the outskirts of the capital.

The project will be sponsored by the Department of Non-Conventional Energy Sources. NPL scientists have demonstrated that fully integrated thin film solar cells measuring 100 sq. cm. can be produced for various consumer applications.

The panels consist of a number of 7 sq. cm. cells connected in a series, with each cell delivering about 105 milliampere current under bright sunlight. The achievement of NPL scientists is

considered "significant" as the development of amorphous silicon-based photovoltaic system has been taken by the Government as a technological mission under the Seventh Plan, NPL officials say. Thin film amorphous silicon cells are not only cheaper but also quicker to produce, according to the NPL group headed by Dr. V.V. Shah, which developed the cells.

Each solar cell consists of a glass substrate coated with a textured layer of tin oxide followed by layers of boron doped silicon carbide, "intrinsic" hydrogenated amorphous silicon, phosphorous doped amorphous silicon and a highly reflective silver layer. The sandwiching of these layers ensures optimal conversion of incident solar energy into electrical energy, scientists say.

EFFORTS TO MINIMISE HAZARDS FROM WASTE

As a result of efforts to reduce pollution, the Rhine is much cleaner than it was at its environmental nadir during the mid-Seventies. Mercury levels have fallen below 0.1 micrograms (millionths of a gram) per litre and the oxygen content is such that there is now little risk of fish dying of oxygen starvation. Levels of organic compounds and inorganic pollutants, such as cadmium and arsenic, have also fallen.

Water companies based along the river have invested heavily. Between 80 and 90% of sewage is now biologically treated before entering the river. Much of chemicals companies' effort has been directed towards investment in equipment to treat liquid waste. A typical plant, breaking down as much as 80% of biodegradable waste into harmless components, works as follows:

Waste water, which tends to be acidic, is neutralised in a tank containing caustic soda or lime. Any alkaline substances are neutralised with sulphuric acid. The resulting liquid is then passed to a sedimentation tank where heavy particles are allowed to settle and are then fed into a sludge storage tank. Flocculation agents are added to the waste water to collect substances which are not easily biodegradable. Air is passed through the liquid to force the blocks to the surface where they are skimmed off.

Next comes a biological purification process similar to that used for domestic sewage. This involves adding micro-organisms which break down the chemicals into a harmless components. Oxygen is pumped through the liquid to accelerate the reaction. Finally, any remaining sludge is sent to the sludge tank where it is thickened by catalysts, subjected to centrifugal treatment to remove water and then incinerated. The ash is put in landfill sites and the treated effluent is pumped back into the Rhine.

More efforts needed

Although this process has reduced pollution, much remains to be done. The industrial effluent discharged into the Rhine can hardly be described as mineral water. Although the river's toxic heavy metal content is a tenth of what it was, it is still 10 times natural levels. The sludge taken out of the port of Rotterdam, where the river slows and large quantities of sediment are deposited, is so heavily contaminated, for example with arsenic, that it has to be put in special storage tanks.

Another pollutant is salt, which enters the river from factories and potassium mines and its level is increasing. At the Dutch border the chloride level in the Rhine is 400 milligrams a litre, whereas the natural level would be about 20 mg. This means that 50,000 tonnes of salt are crossing the German-Dutch border every day. Although the effluent is within standards set by Swiss authorities, risks remain. It has been pointed out, for example, that normally acceptable pollution loads could still lead to dangerously high concentrations if the river's volume dropped during a drought.

The main focus of efforts is increase capacity for dealing w sludge, non-biodegradable and poo biodegradable substances by usi rotary kilns. Incinerating this type waste, rather than dumping it in t ground, reduces the risk of hazardo substances leaking into the water tab and subsequently into the public suppl

Harmless combustion gases

This technology breaks down a wi range of dangerous chemicals. In Ro terdam, one rotary kiln plant is able t burn out more than 99% of waste se there, producing relatively harmles combustion gases. At temperatures a high as 1,400°C, wastes are broke down without creating hazardous sub stances, such as hydrochloric acid, sul phur dioxide, nitrogen dioxide an dioxins, which appear at lower temper atures. Also less ash is produced.

The trend towards rotary kilns has been accelerated by a decision to end the incineration of hazardous waste on ships in the North Sea by 1994. Public concern about burying waste has also been significant. Rotary kilns are also expensive to run. It costs between 2 and 10 times more to incinerate waste than to dump it in landfill sites. It's much more cost effective to control the production of waste in the first place, than to be forced to go to the expense of making it safe afterwards.

There are two main ways of minimising waste. The first is to limit its production during manufacture through what the company calls "clean technologies". This involves optimising production processes; more efficient chemical reactions create less waste. It is also necessary to reject processes which pose insoluble disposal problems or which carry unacceptable risks. The second method is to recycle as much as possible. Ciba-Geigy, for example, has managed to increase the percentage of raw materials that end up in finished products from about 30% in 1970 to approximately 60% by 1988.

Chemical Markets Abroad

AROMATICS CONTRACTS SLIP IN WEAKENING MARKET

A spate of second quarter aromatic contracts have been concluded in Europe. Benzene, toluene and a number of orthoxylene contracts have now been finalized. The contracts generally reflect a volatile spot market and the bearish tendencies which have intermittently swept through aromatics throughout the first quarter.

Benzene contracts were settled at DM850/ton FD ($454/ton), a drop of DM150/ton on first quarter prices. The negotiations have been highly influenced by the US market, where Exxon and Shell revised their original March contracts from $1.60/gallon to $1.55/gallon.

The sliding spot market on both sides of the Atlantic is cited as a factor behind the drop in prices. In Europe, first quarter contracts were agreed at DM1000/ton, at a time when the spot market was up to $585/ton. In the US, some producers posted ideas for January up to $1.90/gallon, although these were soon pinned back. Presently, European spot prices stand at $450/ton with US numbers down to $1.50/gallon; these lower numbers are thought to have strongly influenced second quarter negotiations.

Market observers seem surprised that benzene contracts were concluded so rapidly, with Exxon and BASF leading the market to settle first. Although benzene is expected to be relatively weak for the first part of the quarter, styrene shutdowns, leading to a temporary fall in demand, mean the product could rally in the second half of the quarter.

European cracker shutdowns, scheduled for the second quarter, will limit pygas availability, thus affecting benzene supplies. In addition the potential competitive struggle for toluene feedstock between hydrodealkylation (HDA) benzene producers and gasoline blenders could both limit supplies of benzene and increase prices.

The settlement of some orthoxylene second quarter contracts at DM925/ton, a drop of $25-55/ton on first quarter contracts, again raises the spectre of a continued split on contracts, with the first quarter already showing two numbers, DM950/ton and DM980/ton.

Exxon and Deutsche Shell have led the field in settling this quarter, agreeing DM925/ton with BASF. French producer Total Chimie earlier posted numbers of DM 950-980/ton as its idea for the quarter, but is now unwilling to accept the concluded price of DM 925/ton, prefering to hold out for its proposed ideas. This creates a reverse of the first quarter situation, where Total settled early at DM950/ton, while Exxon and Deutsche Shell held out for the higher number of DM980/ton.

The argument behind the slump in contract prices is based on a dip in buying practices on both sides of the Atlantic. European spot orthoxylene prices have fallen from $605/ton in January to $475/ton, reflecting the lack of buying interest. The slump in US demand has been more pronounced than in Europe. Phthalic anhydride customers have relied heavily on existing stocks throughout the quarter, keeping merchant buying to a minimum.

Orthoxylene buyers have argued that their margins have been reduced to an unacceptable level over the past year. It is felt that feedstock hikes are not being passed on, while falling export demand is clogging the system. In the US, phthalic capacity remains idle while planned re-starts have been delayed. With US April contracts looking set to drop below 24 cents/pound, a figure held since January, high stocks have led to a general stand-off position with immediate purchases grinding to a halt.

The final contract concluded went to press was DSM's nitration grade toluene settled at $335-340/ton, a hike of $25-30/ton. The second quarter price is marginally below the spot figure of $350-355/ton, but seems to reflect the present uncertainty within the market regarding future demand for toluene throughout the quarter.

Market observers feel that octane demand from the gasoline pools of Europe and the US still remains an unknown quantity. Will US octane demand hit the heights of last year and how successful will the European super premium unleaded grade be? One of the reasons for the present spot toluene price of $350/ton is trader speculation on future octane demand.

It appears that traders have sat on quantities of toluene for up to eight weeks, enduring the storage charges, waiting for gasoline pool demand to rise although this demand has yet to materialise. However, the US market is beginning to show sings of life with prices up to $1.17/gallon from $1.13/gallon a week ago.

SHELL SELLS IDLED U.S. VCM PLANT

Shell Chemical of the US has completed its exit from the VCM business following the sale of its idled 320,000 ton/year VCM unit

Norco, Louisiana, to an un-med Taiwanese buyer.

The plant, which has been idl- since 1983, is Shell's last re-aining VCM asset, following the le of the business to Oxychem 1987. The unit is now being smantled and will be relocated ther to Taiwan, or, more likely, e US Gulf coast.

Sources say the buyer is most obably China General Plastics orp (CGPC) which has been ru-oured for some time to be nego-ating purchase of the Shell unit. gnificantly, CGPC is linked to S ldPE producer Westlake Poly-ers which is considering con-ruction of a 450,000 ton/year hylene cracker on the US Gulf ast.

The unit would most likely be rmarked a part of the down-ream operatioons at the cracker te, which is expected to be close Westlake's 270,000 ton/year lyethylene unit at Lake Charles, uisiana — itself a previously led unit bought from City Ser-ces in 1986.

LIN STARTS UP US POLYOLS NIT

Olin Corporation of the US has mpleted a 3,600 ton/year solid lymer polyols unit at its Doe n complex in Kentucky.

The unit has undergone test ns and is now believed to be nning at full capacity. Material m the new unit will be sold on merchant US market.

The plant forms part of Olin's ns to expand its urethane che-cals capabilities. Solid Polymer yols are used in flexible poly-thane foam.

FACES PROPYLENE HIKE MARKET TIGHTENS

The US propylene market has tinued to show strength during the first quarter of 1989, but apparently still insufficient to support two tier pricing. Whilst European numbers stretched to DM-950-995/ton FD in Q1, US levels have stagnated at 20 cents/pound for chemical grade and 23 cents/pound for polymer grade.

A band of producers, led by Shell, Lyondell and Texaco have again had to rescind attempts to get a 1 cent/pound hike on contracts for March. However, undeterred, they are again pushing for a 1 cent/pound increase in April and sources say with the US market now growing much tighter, they have more hope of achieving it.

The tightness of US propylene has been felt by Europe through the reducing level of export shipments. Not a significant factor until recently, westbound shipments of propylene to Europe peaked at around 30,000 ton/month at the turn of the year but have now slipped back to around 10,000 ton/month.

Most movement is confined to product between affiliates or intercompany transfers, with very little material moving on a spot basis. With export propylene only 2 cents/pound above contract postings it is still attractive to European buyers, although product is proving very tricky to locate, particularly in the case of polymer grade.

Sources say that the stagnation in US propylene levels is due to the continued weakness in derivative businesses. Since the third quarter of 1988, US contracts have moved up by only 3 cents/pound whilst European propylene levels have virtually doubled over the same period. Particularly hard hit has been the US acrylonitrile business which is heavily dependent on exports.

Acrylo prices are still weak at around 36 cents/pound, with key export markets for acrylo fibres, such as China, very sluggish, keeping demand for product very low. Although demand for polypropylene is much stronger, prices of this derivative have dropped off by around 2 cents/pound to 46 cents/pound with a reduction in Far East export demand also named as the culprit.

But having been thwarted in attempts to lift propylene prices in the US, sources believe that producers will make a much more determined effort in the second quarter. A number of factors are on their side, not least the increases seen recently in Europe and the continued demand for export product from eager European buyers, especially in the polypropylene sector.

In addition, the market is expected to be tighter during the second quarter with a number of maintenance turnarounds planned and producers holding onto material for inventory building. The most significant is Lyondell, which is taking down its OP-1 and OP-2 crackers off line at Channelview for 6-7 weeks each in succession starting April. Union Carbide and Dow both have units down in April while Oxy's unit at Lake Charles will be closed in June. There is also a move from a feedstock mix of ethane/propane to pure ethane which will reduce output of co-product propylene.

If buyers continue to resist price hikes during the second quarter, there is a chance that US producers may look to lucrative export markets which will have the effect of lifting spot prices and will inevitably contribute to upward pressure in contracts.

Meanwhile, US ethylene contracts are also stagnating and may

now have peaked. Business for March, has been concluded at the 32-33-34 cents/pound levels and although 32 cents may disappear in April, to have higher postings have yet been heard.

The extreme tightness of last year is now receding and with sluggish demand in the export derivative market, pushing down polyethylene and polystyrene prices, no further hikes are in the pipeline.

ENFERSA STARTS AMMONIA UNIT

Enfersa, the Spanish Stazer group has started up a revamped 274,000 ton/year ammonia plant at Cartegena. The unit has been converted from naphtha to natural gas feedstock by Uhde and the Spanish contractor Initec.

According to Uhde, the conversion will reduce energy consumption at the plant by around 15 per cent. The contract was awarded to Uhde in 1986 and work on the plant, which included modification to the CO_2 scrubbing and methanation units, was completed at the end of last year.

The revamped unit will replace three older units at Cartegena which have a combined capacity of 277,000 ton/year based on naphtha. Uhde and Initec are also converting Enfersa's other ammonia unit at Puertollano from naphtha to natural gas, with completion slated for later this year.

Meanwhile ERT, Spain's other ammonia producer has just completed conversion of its 363,000 ton/year ammonia at Huelva from naphtha to natural gas. The plant was converted by Kellogg and Tecnidas Reunidas at a cost of $25M.

TiO_2 BUYERS FACE Q2 PRICE PUSH

World demand for titanium dioxide (TiO_2) continued to show prodigous growth last year, and with no sign of a let up in the critically tight supply/demand balance which has characterized the market recently, buyers are facing yet more price hikes.

Consumption grew by 5 per cent last year to 2.9m ton, representing an effective capacity utilization rate of 100 per cent. With an expected rise in demand of around 3.5 per cent in 1989 and precious little extra capacity due on stream it appears that the dislocation in supply and demand will continue.

Additional pigment capacity has come on stream in the Pacific region following the start up of SCM's 35,000 ton/year expansion at Bunbury in Australia at the end of last year and the imminent start of the first phase of a new plant for ISA Singapore (Ishihara), at Jurang. Other increases are mainly confined to debottlenecking.

The lead on price pushes has been taken this time by SCM. In the US markets, the company has announced a 5 cents/pound increase for April and followed this with the announcement last week of an increase fo 4.5 per cent on European prices which currently stands at DM4,400-4,600/ton.

The US increase will take levels over the psychological $1/pound barrier. So far, other producers have not yet followed SCM's move. The US supply situation is particularly critical. Apart from a 45,000 ton/year expansion by Kemira at Savannah, Georgia, this year no grassroots units are expected before 1991

In addition, producers say tha US numbers will have to move u from their current position as th lowest in the world. This ha made product especially short fo US buyers since it has tended t cut imports from Europe.

Export markets continue to fac severe pressure. Major users i the Far East paint and plastics sector are being forced to cu back on production following the withdrawal of TiO_2 supplies by ex porters for home consumption However, the onset of new capacity in the region has helped buyers keep price hikes down, and most export business is around $2,500/ton cif — a contrast to the South American and the Middle East where export numbers have already passed the $3,000/ton cif barrier.

In Europe, producers say that increases are inevitable following the conclusion of the EEC directive controlling the dumping and discharge of acid wastes from TiO_2 production into the sea.

With the majority of European production still based based on the sulphate route, producers must now install acid recycling units or convert to the cleaner chloride route, which they say will add up to 15 per cent to costs.

CIBA IN AIDS JV

Swiss Pharmaceuticals giant Ciba-Gaigy is to collaborate with Tanox Bio-systems of the US to develop a therapeutic agent for treating Aids. Based in Houston, Texas, Tanox specializes in monoclonal antibody (MAB) products for diagnosing and treating infectious diseases and human immune disorders.

Under the agreement, Ciba Geigy will provide funding for the continued developed of protective MAB's.

News About New Projects

GORBACHEV VISIT EXPECTED TO BOOST ANGLO-SOVIET TRADE

The visit of Mikhail Gorbachev to the UK offers a prospect of new moves in Anglo-Soviet trade. The Soviet president's visit is expected to coincide with the signing of a $330m loan agreement between a group of Western banks and the Anglo Soviet Engineering and Trading Co. (Asetco), a joint venture involving the engineering company John Brown.

The agreement will set the seal on the first serious UK-Soviet venture and one of the most significant joint enterprises so far. It has a most unusual and complex structure designed to overcome problems in dealing with the Soviet system and is expected to serve as a model for other companies.

Owned by John Brown (30 per cent), the London merchant bank Morgan Grenfell (40 per cent) and a group of Soviet entities including the Stavropol production enterprise at Budyennovsk (30 per cent), Asetco will, to begin with, raise capacity of the high density polyethylene (hdPE) plant at Budyennovsk by 100,000 ton/year to 300,000 ton/year. A doubling in capacity to 400,000 ton/year is expected at a later stage.

Union Carbide Corp, the original licensor of the hdPE plant, is providing its latest **Unipol** process technology for the project and, although not part of the joint venture, will act as the trading arm for Asetco.

Linde, the original supplier of the upstream ethylene plant at Budyennovsk, will expand the 150,000 ton/year cracker by 100,000 ton/year, securing feedstock for Asetco.

Arrangements for the expansion of the Kazan polyethylene facility (not included in the $330m) are expected to be finalized by Asetco within the next six months.

In addition, on his last visit to the UK in February this year, minister of the Soviet chemical industry (Minchimprom), Yuri Bespalov, witnessed the signing of a new protocol of intent with John Brown covering further investment in polypropylene and polyethylene plant modernization under the auspices of Asetco.

Acting as advisor to John Brown and Union Carbide Corp., Morgan Grenfells is the manager agent bank and participant as lender to the joint venture. Other banks in the syndicate include the UK's National Westminster, Barclays and Standard Chartered; France's Banque Indosuez, BNP, CIC and Societe Generale; Australia's West Pac; Finland's Posti Pankki and Kansallis-Osake-Pankki; the Arab Banking Corp and several others.

The $330m includes $40-50m capitalized interest and contingency funds to cover extra costs which could be incurred as a result of a fall in polyethylene prices or increase in interest rates. Also covered is the DM100m Linde project's portion, Carbide's licence and the polyethylene expansion costs, John Brown's and local portion.

This is the first limited recourse loan (when the banks share the risk with the Soviets on the viability of the project) to the USSR. Under a polyethylene supply contract, Stavropol, which holds a 12.5 per cent interest in the joint venture, will supply not more than 100,000 ton/year PE over a period not exceeding 13 years, beginning some three and a half years from now, when the project is due to be completed.

Carbide will market the product in Europe, the Far and Middle East.

The loan repayment is expected to be over in 9.5-12 years. Some 20 per cent of the borrowing will be covered by the UK's Export Credit Guarantee Department (ECGD) at consensus rates of 9-10 per cent. The rest will be a floating rate linked to Libor. There will be no unconditional guarantees. The Soviets have undertaken an obligation to deliver good quality product but if the price of PE falls, the banks could end up losing money. However, the banks have analysed the project and satisfied themselves that this will not happen.

The Stavropol enterprise has obtained guarantee from Minchimprom in support of the PE supply contract, which means that Minchimprom will protect the banks from the risk. In the event of not being able to deliver the polymer, cash will be paid to Asetco.

The supply agreement between John Brown and Techmashimport acting on behalf of Minchimprom has already been signed and preliminary work on the project has already begun.

Asetco is expected to be the only chemical venture ready for signature when the Soviet president arrives. Other projects under discussion with UK firms include modernization of acrylic fibre plants at Navoi and Novopolotsk with Courtaulds, new polyester fibre capacity at Mogilev with Davy McKee and some textile pro-

jects with Taylor Woodrow and Courtaulds.

IRAQ PICKS BP LLDPE PROCESS

BP Chemicals' technology has been selected for a new linear low density polyethylene (lldPE) plant in Iraq. The UK firm, which is understood to be finalizing details relating to the licensing contract, will provide its gas-phase, fluid bed technology for a 160,000 ton/year lldPE plant.

Won against competition from Union Carbide Corp and Du Pont Canada, the plant will be one of the main units included in phase one of Iraq's $2.5bn grass roots petrochemical complex at Mussayed, south of Baghdad. A 15,000 ton/year butene 1 facility, also included in the complex, will provide comonomer for the lldPE unit.

Ethylene feedstock will be provided by a 420,000 ton/year plant, which has already been awarded to Lummus Crest. This unit will also supply raw materials for a Scientific Design-process ethylene oxide and glycols complex at the site.

Earlier BP Chemicals licensed its lldPE process to neighbouring Iran. Under the terms of the Iranian contract, Italy's TPL is building a 60,000 ton/year plant at Arak.

Around 70 per cent of the output from Mussayed will be exported, mainly to the South East Asian and African markets. It is not clear whether BP will play an active role in marketing the product.

MITSUBISHI UNVEILS BRAZILIAN PLANS

Mitsubishi Kasei has unveiled its interest in a $104m Brazilian petrochemical expansion programme. Through two joint ventures, the Japanese firm will build a maleic anhydride plant and a polypropylene facility.

Ciek, a joint venture between Elekeiroz and Ciquine Companhia Petroquimica, a joint venture involving the Japanese firm, is investing $34m in a maleic anhydride unit in Camacari. The unit will have a 20,000 ton/year capacity and is to use the Japanese firm's technology.

Mitsubishi Kasei do Brasil president, Hideki Tsubota, revealed that this plant will be on stream by mid 1990 but that the polypropylene plant will not be ready until 1991. The PP plant, to be build by Polialden Petroquimica, will have a capacity of 100,000 ton/year and cost $70m.

Tsubota said that the new PP plant will use Mitsubishi's newly developed vapour phase technology. Both the PP and maleic anhydride plants will source their raw materials from Copene. Products will be mainly for the domestic market, although some will be for export.

DOW PLANS WORLDSCALE CRACKER AT TERNEUZEN

Dow Europe has confirmed rumours that it is planning a worldscale cracker at its site at Terneuzen in the Netherlands. A Dow spokesman said that plans had been given increased impetus following the company's failure to secure the Epsi ethylene and polyolefins complex in Portugal in its joint bid with Repsol.

The company is looking to construct a new cracker of 700,000 ton/year based on flexible feedstock slate as the most economic option, scheduled for start up in the mid-1990s. But Dow also revealed that with such huge investment required, it would be seeking support from other parties and may consider a joint venture.

Plans are still at an early stage, but Dow is thought to be screening potential candidates for the venture with a view to holding talks later in the year. But the spokesman was prepared to admit that the company would be prepared to tackle the venture on its own.

According to Dow, Terneuzen would be the ideal location for a new European cracker, being close to the centre of the petrochemical industry and benefiting from existing services and infrastructure. Informed sources put the cost of building a worldscale cracker on such a Brownfield site at around $550m.

Dow has been constantly reviewing its ethylene position for the 1990s to meet its derivatives expansions and was rumoured for some time to be mulling a new cracker. The company is also adding a total of 160,000 ton/year to its existing Terneuzen crackers scheduled for completion in 1991 and 1992. This will lift total ethylene capacity at the site to 1.1m ton/year. It is also expanding its cracker at Tarragona in Spain, but needs more capacity for the mid-1990s.

However, other sources feel that Dow will find a partner among the everdecreasing band of ethylene players which do not have major expansion plans on the drawing board, including DSM, Exxon and Shell. With most output slated for captive use, the plans for Terneuzen are not thought to jeopardize other cracker projects already announced, despite the cloud of over-capacity hanging over the industry.

Environment

RRUZZI RESEARCH FIRM TO VELOP 'GREEN' CHEMICALS

Ferruzzi has set up a research d development company called rtec to identify and develop the e of agricultural raw materials feedstocks for chemical deri-ives traditionally derived from ohtha.

Ferruzi, which has substantial rochemical and agro-industrial erests, says Fertec will link the o sectors to develop what it ls "green" chemicals that have s environmental impact and e not dependent on non-reusa-e resources.

Key feedstocks include carbo-drates and vegetable oils. Cur-ıtly agricultural products such grain are in oversupply in Eu-ɔe.

According to Professor Amil-r Collina, head of Ferruzzi's D division, research has alrea-produced a new category of degradable plastic materials ntaining starch. Other promis-technologies include the pro-ction of ethylene glycol and pylene glycol from carbohy-tes and plant-based synthetic ricants and detergents.

This year Fertec will spend und L10bn ($7.3m) but as the mber of research programmes d discoveries grow, it is expec-that the budget will increase.

The company says that its first ject for an industrial scale nt for producing biodegradable ducts could be initiated in less n a year.

Owners of Fertec include Fer-zi subsidiaries Agricola Finan-ra, Montedison, Beghin Bay d Eridania. A laboratory will be up in Novara, Italy, specifi-ly for Fertec, and the company will be able to draw on Ferruzzi laboratories worldwide. The Italian giant currently spends L543-bn/year on R&D.

BATTELLE SEEKS PLASTICS JV

Battelle, the Swiss-based research concern, has developed a totally bio-degradable polymer which it says has extremely promising material properties. The company is now in the process of seeking a partner to develop and commercialize the product further. It adds that so far response from interested chemical companies has been surprisingly large.

Initial production experiments have been conducted and Battelle expects that it will be another one to two years before the process technology is ready for industrial application. The cost of this further development is put up to DM2m($1.1m).

The material which is based on starch, is transparent and flexible. Major applications are seen in the in the packaging industry. Battelle says the plastic is resistant to degradation under normal conditions, but in water or wet it decomposes completely to carbon dioxide and water in a few days.

Additives can be used to ease processing of the material, Battelle's work has shown that the product can be injection, extrusion and blow moulded, as well made into foil.

According to the research firm's Frankfurt office, which carried out the development work, the raw material is different to most biodegradable plastics already available on the market. The company says these products are not totally based on starch, but more likely on synthetic polymers starch composites.

ALLIED — SIGNAL's CFC ALTERNATIVES

Allied-Signal has developed a range of solvents to replace ozone-depleting chlorofluorocarbons (CFCs) currently used in cleaning applications in the electronics sector.

Allied says the alternatives based on HCFC-141b, have 90 per cent less ozone depletion potential than CFC-113, which is currently used as an electronic cleaning agent. The US firm estimates that about half of the 75,000 ton/year of CFC-113 currently used in the US could be replaced by the new range.

According to Allied, the new solvents will be available by mid 1992, pending the results of toxicological testing.

In total, the company expects to spend around $250m developing and commercializing CFC alternatives over the next decade.

RHINE POLLUTION

Swiss chemical firms, Ciba-Geigy and Sandoz, have been pinpointed by the international group of waterworks (IAWR) on the Rhine as principal pollution offenders. In a least two cases, the firms failed to inform the waterworks, the public or state authorities of discharges of pesticides and herbicides into the river, the organization said.

Despite announcing plans to create data banks on chemical discharges, improved monitoring methods and a better exchange of information among countries along Rhine, no substantial improvement in water quality has been seen, said IAWR.

Technological Scene Abroad

TORAY CATALYST TO BOOST ICI'S TDP OUTPUT AT WILTON

In the UK, ICI is working to boost its capacity for producing benzene and xylenes. Efforts are focusing on the toluene disproportionation (TDP) unit at the company's Wilton site in the north of England.

Already a new catalyst used in the plant has boosted capacity by nearly 15 per cent, raising output from 70 to 80 ton/day. The catalyst was supplied by Toray Industries of Japan. ICI says the new catalyst is still going through its paces and assessments on its performance are continuing. However, the company adds that it is proving to be more active and stable than the catalyst it replaced.

It allows the TDP plant to be operated at the previous production rate at a lower temperature or at higher production levels without having to go to elevated temperatures. This gives ICI greater flexibility in operating the unit.

Originally the TDP unit was designed with a nameplate capacity of 49 ton/hour. Debottlenecking projects carried cut over the last five years have increased output to its current level. ICI plans to increase production to 90 ton/hr.

Investigations are underway on how to achieve this but the firm said it was too early to give specific details.

The TDP plant converts toluene into a mixture of benzene and xylenes, which are both used by ICI's C&P division in downstream processes. Benzene is used to make cyclohexane, a key feedstock for ICI's nylon production, while xylenes are reisomerized to paraxylene which is used to manufacture PTA.

By boosting its capacities for benzenes and xylenes, ICI is aiming to achieve greater feedstock security.

Currently paraxylene is in tight supply and spot markets are volatile.

ISC EXPANDS ISOFLURANE OUTPUT

The ISC division of RTZ Chemicals has announced plans to build a plant in Avonmouth, UK, for the manufacture of the latest in the line of inhalation anaesthetics, **Isoflurane**. The plant is expected to cost £6m ($10.3m) and completion is projected for 1990.

Isoflurane was developed in the US and first marketed in 1980. Inspite of being difficult and costly to make, **Isoflurane** has several advantages over other inhalation anaesthetics in the market, claims ISC. Its side effects are minimal, causing negligible toxicity to liver or kidneys and virtually no alterations to the blood flow in the body. It is also compatible with drugs commonly given in anaesthesia treatment.

DSM DETAILS NEW MELAMINE UNIT

DSM has announced details of a second melamine plant at Geleen, the Netherlands. The unit, which will cost an estimated Dfl. 150m ($71.4m) to build, will have a capacity of around 25,000 ton/year. It is scheduled to be onstream during 1991.

The new plant, combined the existing facility at Geleen a new US plant, will raise DS total production capacity to above 100,000 ton/year.

The Dutch firm decided build the new plant, as melam consumption worldwide is pected to grow by 5 per cent y DSM is the world's largest m mine producer and a market le er in Europe. Currently wo melamine production capac stands at 375,000 ton/year. Th are between 15-20 produc worldwide.

DSM produces melamine usi its own proprietary process ba ed on ammonia and urea. Bo raw materials are obtained fro the company's own integrate production complex at Geleen.

In most applications melamin a white powder, is converted i to a resin. In this form it highly chemical, heat and scra ch resistant and finds major use as hardwearing worktops an flooring.

SABIC R&D CENTRE

Sabic is planning to build a re search and development centre i Riyadh Saudi Arabia. A SR150m ($40m) contract covering engi neering, procurement and con struction has been signed b Lummus Crest's Dutch subsidia ry. It is expected the centre wil be completed by September 1990

Sabic says the centre will house new product and technologica development, and will focus on industry developments especially in the field of plastic resins. The centre will include facilities for developing new product formula tions and for testing modified process equipment, as well as a polyethylene pilot plant.

MARKET INFORMATION

Aniline Oil Up Again

Aniline oil again became short in Sombay chemical market, due to ull supply position from HOC. Price ose by Rs. 4 to Rs. 60 per kg. Sodium alginate still in short supply quoting Rs. 240 per kg. Rutile variety of titanium dioxide available at Rs. 110 per kg. Triethanolamine quoted higher rate at Rs. 65 per kg. Atul has increased their intermediates prices and kept their dyes prices lower. Hence small manufacturers are facing difficulty in selling their products. Dyes exports good.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent --and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on May 9, 1989)

INDUSTRIAL CHEMICALS	Per Kg.
Ammonium sulphate	2.00
Ammonium phosphate (Mono)	14.50
Ammonium phosphate (Di)	12.00
Ammonium carbonate (Di)	17.00
Ammonium bicarbonate	5.60
Ammonium chloride	3.00
Ammonium nitrate	6.50
Arsenic white powder	23.00
Acrylamide (Resale)	70+ST
Barium carbonate	6.00
Bleaching powder (33% Cl)	4.20
Borax (Granular)	15.00
Borax (Powder)	15.25
Boric acid (Tech)	23.00
Bisphenol-A	70.00
Butyl carbitol	50.00
Caustic soda (Flakes)	13.45
Caustic soda (Solid)	10.00
Caustic soda (Lye)	7.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	4.25
Calcium carbonate (Activated)	4.75
Cobalt oxide	280.00
Cresylic acid	45.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.)	70.00
Citric acid (Belgium) (Resale)	48.00
Citric acid (Indian) (Resale)	51.00
Copper sulphate	24.00
Chromic acid	61.00
Ethylene urea	58.00
Ferric chloride (Lumps)	5.50
Ferric chloride (Anhydrous)	16.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	112+ST
Hydro	40+ST

Hyflosupercell	18+ST
Hexamine (Resale)	34.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	31.25
Lithopone	18+ST
Magnesium chloride (Crystal)	1.25+ST
Menthol crystal (Flakes)	900+Ex+ST
Menthol bold	665+Ex+ST
Menthol crystal cold	700+Ex+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate (Indian)	18.00
Maleic Anhydride (Resale)	37.00
Mercury (175 lbs)	13,000.00
Nickel chloride	110.00
Oxalic acid (Resale)	24.00
Peppermint oil (Rectified)	195+Ex+ST
Potassium carbonate (Indian)	24.00
Potassium carbonate (Imported)	24.00
Potassium bichromate	27+ST
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	120+ST
Polyvinyl alcohol (No. 173)	140+ST
Polyvinyl alcohol (No. 208)	150+ST
Paraformaldehyde (Resale)	22+ST
Phthalic anhydride 36% (Resale)	29.00
Pentaerythritol (Resale)	45.00
Paraffin wax	16+ST
Rangolite (German)	80+ST
Rangolite (Czech.)	64+ST
Sodium sulphate (Fine)	6.00
Sodium sulphate (Coarse)	5.00
Sodium sulphide 50-52% (Flakes)	11+ST
Sodium sulphide 58-60% (Flakes) (TCL)	20.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	680.00
Sodium chlorite 80% (Spain)	88.00
Soda Ash (Tata)	5.00
Soda Ash (Birla)	4.50
Soda Ash (Imp.)	4.00
Sodium bicarbonate	7.50
Sodium bisulphite	4.50
Sodium silicate	3.00
Sodium acetate	5.00
Sodium alginate	240+ST
Titanium Dioxide (Anatase)	90+ST
Titanium Dioxide (Rutile – RCR_2)	110+ST
Tartaric acid	102.00
Trisodium phosphate	5.50
Thiourea	80+ST
Urea (Tech.)	2.90
Vacuum salt	1.00
Zinc Dust	32.00
Zinc Oxide	50.00
Zinc chloride powder (Tech.)	12.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	15.00
Acetic Anhydride (Resale)	32.00
Acetone (Resale)	16.50
Adipic Acid	57.00
Aceto Acetanilide	55.00
Aniline Oil	60.00
Benzoate Plasticiser	62.00
Butyl acrylate	78+ST
Butyl stearate	35.00
Butanol	35+S
Benzyl Alcohol	60.0
Benzyl Chloride	34.0
Benzo trichloride	16.0
Benzoyl chloride	22.0
Bromine Liquid	90.0
Chloroform	30.0
Carbon Tetrachloride	20.0
Cellosolve	56+S
Cyclohexanone	58+S
Cyclohexanol	56.0
Diacetone (Resale)	34.0
Diethyl Oxalate	34.0
Diethyl glycol (DEG)	42+S
Dioctyl Phthalate	43.0
Diallyl Phthalate	56.0
Dimethyl Phthalate	28.0
Dioctyl Adipate	52.00
Dibutyl Adipate	42.00
Dipentene	15.00
Dimethylamine 40%	12.00
Dimethylamine 50%	14.00
Ethyl Acetate	20.00
Ethyl Acrylate	65.00
Ethylene Dichloride	16.00
Ethylene Glycol	46+ST
Formic Acid (Imp.)	28.00+ST
Formaldehyde (Resale)	7.50
Glycerine (CP)	55.00
Glycerine (IW)	50.00
Hydrogen Peroxide 50% (Resale)	28.50
Isopropyl Alcohol	28.00
Isobutyl Alcohol (Resale)	30.00
Monoethanolamine (Resale)	61.25
Melamine	80+ST
Methyl Ethyl Ketone	48.00
Methyl Isobutyl Ketone	42.00
Methyl Acrylate	42.00
Methyl Dichloride (Resale)	26.00

Carbitol	68+ST
Meta Cresol	45.00
Nitrobenzene	30.50
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	37.00
Propylene Glycol	52+ST
Polyethylene Glycol (No.200)	52.00
Polyethylene Glycol (No.400)	54.00
Polyethylene Glycol (No.500)	42.00
Polyethylene Glycol (No.1600)	14.00
Polyethylene Glycol (No.4000)	38.00
Polyethylene Glycol (No.6000)	50.00
Para Cresol	40.00
Styrene Monomer	43.00
Sorbitol	15.00
Sulphuric Acid	2.80
Trichloroethylene	29.50
Triethanolamine (Resale)	65.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	47.50

SOLVENTS	Per Litre
Benzene	9.75
N-Heptane	10.50
N-Hexane	12.00
Methanol	9.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	17.50
Xylene	17.50

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	180.00
Aceto Acetic Ester (Methyl)	64.00
Ammonium Molybdate	210.00
Anthraquinone	125.00
Anthranilic Acid	75.00
2-Amino 4-Nitrophenol	135.00
Blue B. Base (Local)	265.00
Beta Naphthol (Atul)	77.00
Benzidine Dihydrochloride (BDH)	98.00
Bromamine Acid	500.00
BON Acid	135+Ex+Ta
Chicago Acid IRS	330.00
Coach Acid	55.00
C. Acid (Imp.)	190.00
Cyanuric Chloride	140.00
2,4- DNCB	30.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	73.00
Diethyl Aniline	170.00
Diamino stilbene disulphonic acid	160.00
3,3-DCB (Imp.)	165.00
Gamma Acid (Atul)	195.00
H. Acid (Atul)	150.00
G. Salt	78.00
Isophthalic Acid	45.00
J. Acid	300.00
J. Acid Urea	365.00
K. Acid	115.00
MPDS (German)	185.00
MNA	120.00
Meta Ureido Aniline	210.00
MPD (Local)	205.00
MPD (Japan)	240.00
Naphthenic Acid	40.00
N-Methyl J. Acid	485.00
N-Methyl Aniline	120.00
Naphthalene (Refined)	24.00
Ortho Anisidine (OA) (Imp.)	115.00
Ortho Dichloro Benzene (ODCB)	15.00
OT Base	115.00
Para Dichloro Benzene (PDCB)	28.00
Para Anisidine (PA local)	140.00
PNA	95.00
Para Cresidine (Imp.)	360.00
Para Amino Azo Benzene (India)	185.00
PNCB	41.00
Para Amino Acetanilide	160.00
1-Phenyl 3-Methyl 5-Pyrazolone	140.00
Phenyl J. Acid	325.00
Para Amino Benzoic Acid	170.00
PT Base	150.00
Rhoduline Acid	525.00
Resist Salt 80%	32.00
Resorcinol	190.00
Sodium Naphthionate	67.00
5-Sulpho-Anthranilic Acid	80.00
Sulphanilic Acid	50.00
Sulpho Tobias Acid	155.00
Trichloro Benzene (TCB)	22.00
Tobias Acid	145.00
Metanilic Acid	60.00
MTD	120.00

Bombay Dyes Market

(Prices as on May 9, 1989)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet [illegible]	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60
Red 2B	422
Red FB	425
Red Violet FBL	622
Orange 3R	254
Violet 3R	370
Violet RL	355
Violet 6R	638.2
Scarlet RR	283.5
Rubine 3B	289.1
Rubine CB	449.5
Blue GL	419.0
Blue BGF	805.80
Navy Blue RE	359.90
Brown 3REL	272.80
Black GEL	420.10
Dark Brown 3B	411.10

BASE COLOURS	Per Kg.
Fast Yellow GC	77.75
Fast Orange GC	128.40
Fast Scarlet R	198.05
Fast Scarlet RC	128.40
Fast Scarlet RCR	105.60
Fast Scarlet G	115.75
Fast Scarlet GN	92.95
Fast Scarlet GG	77.75
Fast Scarlet GGS	73.95
Fast Red B	233.50
Fast Red RC	115.75
Fast Red R Flakes	158.80
Fast Red TR	181.60
Fast Red TR Oil	223.35
Fast Red RL	251.20
Fast Red KB Oil	251.20
Fast Bordeaux GP	236.00
Fast Garnet GBC	103.05
Fast Violet B	548.80
Fast Blue BB	566.50

NAPHTHOL COLOURS	Per Kg.
ASG	301.85
AS	205.65
ASSW	379.10
ASBS	253.75
ASBO	266.40
ASD	209.45
ASOL	243.60

TR	369.00
SPH	336.05
SE	236.00
SEL	249.95
SLB	2002.35
SBT	2459.45
SWG	143.00
SSG	538.65
SSR	652.60

PROCION COLOURS	Per Kg.
Golden Yellow HR	207.95
Brill. Yellow H4G	145.65
Supra Yellow H-8GP	168.55
Brill. Yellow HE6G	214.75
Yellow G-E4R	276.05
Brill. Yellow H7G	332.30
Yellow M4R	275.45
Yellow MGR	387.65
Brill. Yellow M4G	201.15
Brill. Yellow M8G	366.10
Yellow M3R	244.70
Brill. Orange H2R	303.80
Brill. Red H7B	157.95
Brill. Orange M2R	313.15
Brill. Red H8B	213.55
Brill. Scarlet H RN	245.05
Supra Red H-3BP	179.80
Brill. Red H-F3B	243.45
Brill. Magenta HB	182.00
Brill. Red M 5B	160.05
Brill. Red M 8B	218.35
Brill. Pink MB	137.10
Brill. Magenta MB	163.65
Brill. Purple H-3R	219.55
Brill. Purple H-7R	175.40
Navy Blue H 3R	333.75
Brill. Blue H-GR	406.40
Brill. Blue H5G	207.95
Blue H 5RX	286.20
Brill. Blue H 7G	213.95
Brill. Blue H 7RX	358.15
Turquoise HA	265.05
Supra Blue H-3RP	595.30
Supra Turquoise H 2G P	181.50
Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827.05
Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Powder Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D. Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.60
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp.	490.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: MAY 5, (NNS) Cheerful conditions prevailed in the local chemicals market during last week, on account of good enquiries as well as tight supply position, says NNS. Mercury however, slipped by Rs. 100 owing to slack demand by consumers.

Rangolite Germany hardened by Rs. 2 at Rs. 74 per kg owing to reduced import from Germany as well as negligible stock position. Chatkolite eased by Rs. 2 at Rs. 58 owing to easy supply in the beginning of the week, but later in the wake of good offtake by consumers, it rallied again and quoted at Rs. 60 per kg. Dakolite was quoted at Rs. 60, while sufolite was not available in the market. Prices of sodium hydrosulphite ruled quiet at Rs. 35/40 on withdrawal of demand by gur and khandsari makers.

Camphor thal came down by Rs. 2 at Rs. 105 on satisfactory supply position. Camphor powder also ruled quiet at Rs. 94. Supply position of mercury has eased considerably, consequently the prices of mercury declined by Rs. 100 at Rs. 12,300 per flask. After an initial spurt, prices of menthol medium and bold were offered lower at Rs. 235 and Rs. 245 per kg owing to increased selling pressure by stockists. Menthol flake also lower at Rs. 210 against Rs. 220 on poor stockists demand. Buyers were out of the market. Mentha oil ruled steady at Rs. 160 and DMO was traded at Rs. 80 per kg.

Citric acid China drifted lower by Rs. 50 at Rs. 2,300 per 50 kg thanks to easy offerings of Chinese goods. Citric acid Bombay Dyeing ruled steady at Rs. 2,500 owing to scanty supply. Prices of tartaric acid were ruling at Rs. 7,250 per 50 kg over the week. Supply position in caustic flake is becoming difficult, consequently the prices of this commodity hardened again by Rs. 15 at Rs. 580/585 per 50 kg. With export commitments still on hand, local manufacturers are having only small quantities of caustic flake to offer to the market. Soda ash and soda bicarb also ruled static. Borax granular quoted higher by Rs. 5 on reduced inflow.

Titanium dioxide Anatase went up sharply by Rs. 6 at Rs. 98 per kg in the absence of any supply from Kerala as well as dwindling stock position in the market. Titanium dioxide RC.822 on the other hand, eased by Rs. 1 at Rs. 99 per kg due to poor offtake. Hydrogen peroxide eased from Rs. 28 to Rs. 27.50/27.75 per kg on poor offtake. No noticeable change was recorded in dyes colours and other chemicals.

(DELHI MARKET RATES AS ON MAY 5, 1989)

Ammonia Bicarb (Per 25 Kg.)	135.00
Mercury (Per flask)	12,300.00
Soda ash (Per bag)	340/350.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	580/585.00
Citric acid (Per 50 Kg.)	2,300/2,500.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	100.00
Stable Bleaching Powder KCl (Per 25 Kg.)	95.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	98.00
Sodium Bicarbonate (50 Kg.)	285/300.00
Sodium Hydrosulphite (Per Kg.)	35.00/40.00
Rangolite (Per Kg.)	60.00/74.00
Boric acid Technical (Per 50 Kg.)	1,175.00
Paraffin Wax (Per 50 Kg.)	750.00
Tartaric Acid (Per 50 Kg.)	7,250.00
Borax Granular (Per 50 Kg.)	670.00
Borax Crystal (Per 50 Kg.)	675.00
Sodium Nitrite (Per 50 Kg.)	660/760.00
Sodium Nitrate (Per 50 Kg.)	415.00
Camphor Thal (Per Kg.)	105.
Camphor Powder (Per Kg.)	94.
Menthol Bold (Per Kg.)	245.
Menthol Medium (Per Kg.)	235.
Menthol Flake (Per Kg.)	210.
Glycerine (Per Kg.)	48/50.
Sodium Silicate (Per quintal)	250/300.
Hexamine (Per Kg.)	36.
Acetic Acid Glacial (Per Kg.)	16:
Copper Sulphate (Per quintal)	2,400/2,60
Formic Acid (Per Kg.)	26.
Formaldehyde (Per Kg.)	8.
Hydrogen Peroxide (Per Kg.)	27.50/27.
Calcium Carbonate (Per Tonne)	2,500/4,000
Acid Slurry Soft (Per Kg.)	24.00
Acid Slurry Hard (Per Kg.)	32.00
Phosphoric Acid (Per 50 Kg.)	960.00
Potassium Nitrate (Per quintal)	900/1,200.00
Potassium Permanganate (Per 50 Kg.)	3,350.00
Sodium Bichromate (Per 50 Kg.)	1,575/1,600.00
Trisodium Phosphate (50 Kg.)	550.00
Titanium Dioxide Anatase (Per Kg.)	98.00
Titanium Dioxide RC-822 (Per Kg.)	99.00
Zinc Oxide (Per metric tonne)	40,000/45,000.00
Phenol Carbolic Acid (Per Kg.)	37.00
Carbon Tetrachloride (Per Kg.)	21.75
Chloroform (Per Kg.)	28.00
Sodium Sulphate (Per metric tonne)	3,200/3,500.00
Naphthalene Balls (Per 50 Kg.)	1,450.00

DYES & COLOURS	(Per Kg.)
Naphthol AS	162.00
Naphthol ASG	252.00
Naphthol ASBS	250.00
Naphthol ASTR	325.00
Naphthol ASOL	208.00
Naphthol ASBO	225.00

DIRECT DYES	(Per Kg.)
Black E. Conc.	110/160.00
Diazo Black B.T.	105/135.00
Green B	100/127.00
Blue 2-B	60/92.00
Sky Blue FB	213.00
Basic Auramine	55/110.00
Basic Rhodamine	250/400.00
Basic Methylene Blue	92/130.00
Basic Violet	145/170.00
Basic Malachite Green	150/165.00
Acid Orange	45/88.00

Madras Market

Markets were quite active during e week with prices of caustic soda akes going up further. Asian Per-kide Limited a unit put up by NRI's Tada (A.P.) close to the Tamil adu border has commenced com-ercial production. Though this unit as been put up for 100 per cent xports, sale of some quantities to the local market has been permitted for seed marketing purpose. Also, this week another unit, a small scale manufacturer of borax and boric acid, M/s. Bhansali Chemical Industries has gone into production. There has been pick-up in the sale of dyestuffs in spite of fluctuations in yarn prices.

(MADRAS MARKET RATES AS ON MAY 6, 1989)

cetic Acid Glacial (per kg)	17.00
luminium Sulphate Iron free (per MT)	3,000.00
mmonium Bicarbonate (per 25 kgs)	125.00
mmonium Chloride (per MT)	3,000.00
cid Slurry (per kg)	28.00
arium Carbonate (per kg)	6.00
arium Chloride (per kg)	5.50
oric Acid Technical (per kg)	24.00
leaching Powder (per 50 kgs)	220.00
orax (per 50 kgs)	650.00
austic Soda Flakes -- Mettur Chemicals (per MT)	11,500.00
austic Soda Flakes -- Andhra Sugars (per MT)	11,500.00
alcium Chloride 70% Solid (per MT)	3,000.00
alcium Chloride Anhydrous (per MT)	6,000.00
alcium Carbonate (Activated) (per MT)	5,750.00
Calcium Carbonate (Precipitated) (per MT)	4,750.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	108.00+ED
Pure Para Cresol 96% (per kg)	77.00+ED
Meta Para Cresol 42% (per kg)	47.00+ED
Formic Acid (per kg)	27.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine (per kg)	48.00
Hydrosulphite of Soda (TCPL) (per kg)	38.00
Hydrosulphite of Soda (IDI) (per kg)	42.00
Hydrosulphite of Soda (BASF) (per kg)	42.00
Hexamine (per kg)	30.00
Hyflo Supercell (per kg)	19.50
Hydrogen Peroxide (per kg)	28.00
Litharge (per kg)	40.00
Lead Acetate (per kg)	42.00
Magnesium Carbonate (per kg)	19.00
Magnesium Chloride (per kg)	3.00
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	325.00
Oxalic Acid (per kg)	25.00
Paraffin Wax (per kg)	14.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	21.00
Polyvinyl Alcohol powder (per kg)	130.00
Pentaerythritol (per kg)	50.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	360.00
Soda Ash (TATA) (per 75 kgs)	360.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,500.00
Sodium Bichromate (per kg)	26.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	15.00
Sodium Sulphide Flakes (per kg)	13.50
Sodium Bisulphite (per kg)	4.25
Sodium Alginate (per kg)	210.00
Sodium Acetate (per kg)	7.00
Sodium Sulphate (Anhydrous) (per kg)	3.00
Titanium Dioxide (Anatase) (per kg)	76.00
Titanium Dioxide (Rutile) (per kg)	92.00
Trisodium Phosphate (per kg)	6.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	50.00
Zinc Chloride Powder (per kg)	12.00
Zinc Sulphate (per kg)	6.50

SOLVENTS

Acetone -- HOCL (per kg)	18.00
Butanol (per kg)	35.00
Butyl Acetate (per kg)	42.00
Benzene (per lit)	12.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	20.00
Chloroform (per kg)	26.00
Diacetone Alcohol (per kg)	29.00
Diethylene Glycol (per kg)	45.00
Dichloroethane (per kg)	17.00
Di-octyl Phthalate (per kg)	48.00
Di-N-butyl Phthalate (per kg)	48.00
Ethyl Acetate (per kg)	20.00
Isopropyl Alcohol (per kg)	32.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	26.00
Methyl Ethyl Ketone (per kg)	45.00
Methyl Isobutyl Ketone (per kg)	38.50
Phenol (per kg)	35.00
Sorbitol (per kg)	15.00
Triethanolamine (per kg)	60.00
Trichloroethylene (per kg)	25.00
1-1-1 Trichloroethane (per kg)	27.00
Turpentine (per lit)	16.00
Toluene (per lit)	14.00
Xylene (per lit)	16.00

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Approx sailing d (5)
7/5	Pazin	Oceanic	Jeddah; Rijeka	20/5
16/5	Navigare	Seaspeed/	Tilbury; London; Felixstowe; Manchester; Liverpool; Avonmouth; Le Havre; Rotterdam; Hamburg; Antwerp; Bremerhaven and Scandinavian Ports. (Carting at Hay Bunder No. 3)	20/5
		L. Triest	Jeddah; Trieste; Venice; Ravanna; Rijeka; Naples (Carting M-171/173 C.D.)	
13/5	Vishva Siddhi (Ind)	S.C.I	Aqaba; P. Said; & Med. Ports	20/5
17/5	Orient Triumph (Voy-308)	Transworld	Djibouti; Hodeidah; Alexandria; Benghazi; Tripoli; Malta; La Spezia; Mersin; Naples; Limassol; Piraeus; Genoa; Leghorn; Fos; Valencia; and all Inland Destinations; Jeddah; P. Sudan; Assab; Massawa. (Carting at M-178/180 Cotton Depot)	21/5
15/5	Pavel Mizichevic (Rus)	Transocean/	Tilbury; Avonmouth; Liverpool; Manchester; London; Felixstowe; Birmingham; Antwerp; (Rotterdam); Hamburg; Bremen; Copenhagen; Gothenburg; Oslo; Stockholm; Malmao; Leeds. (Carting at T.P. No. 3)	18/5
		I.S.S. Co.	Felixstowe; Tilbury; Antwerp; Rotterdam; Hamburg; Bremerhaven & Scandinavian Ports via Hamburg. (Carting at Wadi Bunder No. 3)	
21/5	Stonewall Jackson	Samarth	Assab. (Carting at P/Q-PD)	22/5
21/5	Bhartendu	S.C.I.	U.S.S.R. Ports	25/5
16/5	Maersk Clementine	Volkart Fleming	Leghorn; Marseilles; Naples; Barcelona; Bilbao; Bordeaux; Alicante; Genoa; Valencia; Bremen; Jeddah; Antwerp; Rotterdam; Bremerhaven; Hamburg; U.K. & Scandinavian Ports. (Carting at M.O.D. No. 2)	20/5
4/6	Yulius Fuchik (Rus) (Voy-99 W/B)	Transocean	Odessa; Izmail; Reni (U.S.S.R.); Russe; Bulgaria; Budapest; (Hungary); Linz; Vienna (Austria); Bratislava; (Czechoslovakia); Deggendorff; Regenborg; (West Germany); (All Port on river Danube) (Carting at N/O-PD & G-PD)	5/6
17/5	Orient Triumph (V-308)	Transworld	Monrovia; Lome, Lagos; Douala; Tema; Takordi; Abidjan; San Pedro. (Carting at M-178/180 Cotton Depot)	21/5
16/5	Maersk Clementine	V. Fleming	Lagos/Apapa; Dakar; Freetown; Monrovia; Abijian; Lome; Cotonou; Douala; Tema. (Carting at M.O.D. No. 2)	20/5
7/5	Nikolay Semashko	Transocean	Singapore; Main Japan Ports	17/5
15/5	Kamnik (Yug)	Depe	Singapore; Hongkong; Keelung; Kaohsiung; Yokohama; Kobe; Busan	20/5
15/5	Tulsidas (Nhava Sheva)	S.C.I.	Singapore & other Far East Ports. (Carting Kalamboli CWC)	19/5
16/5	Maersk Clementine (Sing) (V-8920)	Volkart Fleming	Penang; Singapore; Hongkong; Keelung; Kaohsiung; Busan; Main Japan Ports Manila; Jakarta; Surabaya; Bangkok; P. Kelang; Chinese Ports. (Carting at M.O.D. No. 2)	20/5
20/5	L.M. Noble Lady	M.C.S./	Singapore; Surabaya; Djakarta & Other Fast East P. (Carting H.B. No. 4)	25/5
		Silver Ship	Singapore; Far East & Japan Ports. (Carting at 19-ID)	
21/5	Stonewall Jackson	Samarth	Singapore. (Carting at P/Q-PD)	22/5
15/5	Tulsidas (Nhava Sheva)	S.C.I.	Melbourne; Fremantle; Adelaide; Sydney (Carting Kalamboli CWC)	19/5
20/5	L.M. Noble lady	Silver Ship	Sydney; Melbourne; Brisbane; Adelaide; Fremantle; Auckland; Wellington; Lyttelton; P. Chalmers. (Carting at 19-ID)	25/5
10/5	Orient Triumph (V-308) (Cyp)	Transworld	Sharjah; Dubai; Abu Dhabi; Ajman; Doha; Kuwait; Dammam; Baghdad/ Basrah; Syria & Inland Destinations In Gulf. (Carting M-178/180 C.D.)	21/5
14/5	Navigare	L. Triest/	Dubai; Dammam; Riyadh; Muscat; Abu Dhabi; Doha; Kuwait; Bahrain. (Carting at M-171/173 Cotton Depot For L. Triest)	20/5

(1)	(2)	(3)	(4)	(5)
		Seaspeed/ Parekh	Dubai; Dammam; Bahrain; Kuwait; Doha. (Carting at H.B. No.5) Muscat; Dubai; Sharjah; Abu Dhabi. (Carting Hay Bunder No. 4)	
6/5	Maersk Clementine	V. Fleming	Dubai; Dammam; Muscat; Bahrain; Kuwait; Riyadh; Doha. (Car. MOD.2)	20/5
7/5	Mercs Serendib	Sai Ship	Colombo	22/5
5/5	Tulsidas	S.C.I.	Colombo; Chittagong. (Carting at Kalamboli CWC)	19/5
0/5	L.M. Noble Lady	Silvership	Chittagong. (Carting at 19-D)	25/5
7/5	Orient Triumph (Voy-308)	Transworld/ O.S.A.	Los Angeles; Longbeach; Sanfrancisco; Oakland; Seattle; Vancouver; New York; Boston; Toronto; Montreal; Philadelphia; Norfolk; Baltimore; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston. (Carting at M-178/180 Cotton Depot for Both)	21/5
15/5	Pavel Mizichevic	Marathon	Boston; New York; Baltimore; Norfolk. (Carting at Wadi Bunder No.3)	18/5
16/5	Navigare (V-703) (Ger)	Oceanic/	New York; Baltimore; Philadelphia; Chicago; Boston; Norfolk; Atlanta; Charleston; Savannah; Miami; Houston & Other Inland Destinations. In U.S. E. Coast & S. American Ports. (Carting at Wadi Bunder No. 3)	20/5
		Seaspeed	New York; Baltimore; Norfolk; Savannah; Charleston; Houston and S. American Ports	
16/5	Maersk Clementine (Voy-8920)	Volkart Fleming	New York; Philadelphia; Baltimore; Norfolk; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston; Toronto; Montreal; Chicago; Atlanta; Denver; Dallas; Wilmington; Milwaukee; Detroit; Minneapolis; Memphis; Nashville; Cleveland; Phoenix; Boston; Los Angeles; Vancouver; Seattle; Sanfrancisco; Portland; Longbeach; Mexican & S. American Ports. (Carting at M.O.D. No. 2)	20/5
21/5	Stonewall Jackson	Samarth	Philadelphia; Baltimore; Norfolk; New Orleans; Houston; Savannah; New York. (Carting at P/1-PD)	22/5

VESSELS DUE IN BOMBAY FOR IMPORT DISCHARGE

Due Date	Steamer's Name	Agents	From
18/5	CPC Gallia	Neptune Ace	Rotterdam
27/5	CPC Nippon	Neptune Ace	Japan
5/6	Diana (V-Th 29)	Choice	S. America
29/5	Ind. Valour	I.S.S. Co.	U.K. Cont.
18/5	Ind. Progress	I.S.S. Co.	U.K. Cont.
18/5	Jag Kala	S.C.I.	U.K. Cont.
25/5	Ind. Goodwill	I.S.S. Co.	U.K. Cont.
21/5	Jala Gopal	S.C.I.	U.S.A./Canada
20/5	Pericles	Sai Ship	Brazil
25/5	Richmond (V. Th-23)	Choice	S. America
21/5	Stonewall Jackson	Samarth	U.S.A.

MATERIALS IMPORTED

(Contd. from the previous issue)

BOMBAY
(From 10-2-1989 to 13-2-1989)

NAVINYL SULPHONATE: From FRG: Platewell Processess & Chemicals, 650 kgs., Rs. 19,290.

N-HEPTANE : From Netherlands: Thermax Pvt. Ltd., 22,308 kgs., Rs. 2,59,053.

5 NITRO -2 FURFURALDEHYDE DIACETATE: From Hungary: Kemwell P. Ltd., 5,000 kgs., Rs. 2,43,111.

N N DIHYDROXY ETHYL M TOLUIDINE: From FRG: Ajay Dyechem Inds., 400 kgs., Rs. 50,580.

NON ETHYL N4: From UK: May & Baker (India) Ltd., 1,800 kgs., Rs. 7,53,902.

NOVOLDIAMINE: From FRG : Bayer India Ltd., 1980 kgs., Rs. 6,68,498; E. Merck India Ltd., 1,650 kgs., Rs. 5,50,127.

N-PROPYLAMINE: From FRG: Pfizer Limited, 4,620 kgs., Rs. 1,81,218; Suneeta Chemicals, 2,100 kgs., Rs. 81,288.

ORTHO NITRO CHLORO BENZENE: From UK: Alchemie Dyechem Pvt. Ltd., 15 MTs., Rs. 3,20,973.

ORTHO NITRO TOLUENE: From FRG: Liberty International Ltd., 14,400 kgs., Rs. 50,481.

PARAFORMALDEHYDE 91% PRILLS: From Spain: Jindal Dye Intermediate Pvt. Ltd., 36,000 kgs., Rs. 2,66,126.

POLYVINYL ALCOHOL: From Japan: Adil Synthetics Pvt. Ltd., 1,000 kgs., Rs. 47,250, K. J. Tex Pvt. Ltd., 1,500 kgs., Rs. 70,876; National Organic Chemical 1 MT., Rs. 59,455; From Japan: Rabbani Textiles 1,000 kgs., Rs. 47,251; Shah International, 2220 kgs., Rs. 94,745; Thacker Velvet Industries Pvt. Ltd., 5 MTs., Rs. 2,13,388.

POLYVINYL BUTYRAL RESIN: From Japan: Atul Glass Inds., Pvt. Ltd., 6,965.16 Sqm. Rs. 3,09,996.

POLYVINYL PYRROLIDONE : From FRG: Siemens Ltd., 540 kgs., Rs. 85,933.

POTASSIUM HYDROXIDE : From Czechoslovakia; Arofines, 5 MTs., Rs. 60,450.

PSEUDOIONONE 90% : From FRG: Seva Enterprises, 13,260 kgs., Rs. 13,93,922.

PYRIDINE: From USA: Ranbaxy Laboratories Ltd., 5 kgs., Rs. 2,98,249.

RANGOLITE: From FRG : Reliance Industries Ltd., 5,000 kgs., Rs. 3,91,388.

SILICA : From FRG: Asian Paints (I) Ltd., 3,000 kgs., Rs. 2,37,413.

SODIUM FORMALDEHYDE SULPHOXYLATE 98% MIN : From China: Janki Prasad & Sons, 2,450 kgs., Rs. 37,529; From Hong Kong: D. R. Corporation 12 MTs., Rs. 1,83,819.

SODIUM STARCH GLYCOLATE: From Hungary: Glindia Limited., 200 kgs., Rs. 18,290.

TERTIARY DODECYL MERCAPTAN: From FRG: Asian Paints (I) Ltd., 990 kgs., Rs. 32,443.

TITANIUM DIOXIDE : From FRG: Swadeshi Polytex Ltd., 10,000 kgs., Rs. 3,91,112.

TITANIUM DIOXIDE PIGMENTS: From USA: Asian Paints India Ltd., 85,000 kgs., Rs. 28,63,220.

TITANIUM DIOXIDE PIGMENT 97%: From China: U.K. Paint Industries, 100 MTs., Rs. 20,57,678.

TITANIUM DIOXIDE RUTILE : From UK: Garware Paints Ltd., 60,000 kgs., Rs. 22,90,881.

TITANIUM DIOXIDE RUTILE RCR2: From UK: U.K. Paints Industries, 60 MTs., Rs. 22,90,882.

TRIETHYLENE GLYCOL: From FRG: Garware Plastics & Polyester Ltd., 2,860 kgs., Rs. 87,827.

2-4 XYLIDINE: From Switzerland: Indian Dyestuff Inds. Ltd., 2.600 MTs., Rs. 1,84,433.

YELLOW PHOSPHOROUS : From China: Excel India Ltd., 201.60 MTs., Rs. 56,01,959.

MATERIALS EXPORTED

BOMBAY
(From 9-8-1988 to 13-8-1988)

ACETOACET-META-XYLIDINE : To Felixstowe: Colour Chem Ltd., 6,720 kgs., Rs. 5,07,439.

ALUMINIUM CHLORIDE: To Felixstowe: Mangalam Inorganics Pvt. Ltd., 32,000 kgs., Rs. 3,91,114; To Keelung: Kline Chemicals Pvt. Ltd., 18,000 kgs., Rs. 2,50,000; To Mombassa: Dharamseys, 36 kgs., Rs. 66,800.

ANTHRAQUINONE PURE 99%: To London: Mangalya Trading Investments Pvt. Ltd., 15,000 kgs., Rs. 7,47,000.

AROMATIC CHEMICALS: To Dubai: Jamal and Co., 560 kgs., Rs. 1,96,000; To Hamburg: K.V. Arochem Ltd., 7,000 kgs., Rs. 5,86,000; To Muscat: Reza Trading Co., 100 kgs., Rs. 12,800.

BENZIDINE DIHYDROCHLORIDE: To Rotterdam: Sunbeam Monochem Pvt. Ltd., 6206.900 kgs., Rs. 2,62,290.

BETA NAPHTHOL: To Hamburg: Beta Naphthol Pvt. Ltd., 15,000 kgs., Rs. 4,96,113.

BORAX PENTA HYDRATE: To Daressalam: Metochem Exports P. Ltd., 1,000 kgs., Rs. 15,000.

4,4-DIAMINO DIPHENYL SALT: To Rotterdam: Jindal Dye Intermediate Pvt. Ltd., 8982.1 kgs., Rs. 3,40,000.

DIAMINO STILBENE: To Kobe: Priya Elect & Chem Ltd., 8,150 kgs., Rs. 7,53,802; To New York: Vasant Chemicals, 5,234.8 kgs., Rs. 5,67,420.

DICALCIUM PHOSPHATE: To Frecmantle: National Traders and Exporters, 39,840 kgs., Rs. 1,33,-159; To Melbourne: National Traders and Exporters, 19,920 kgs., Rs. 66,579.

DICHLORO ANILINE: To Kobe: Jay Chem Industries, 5,075 kgs., Rs. 2,60,000.

DIHYDROXY ANTHRAQUINONE: To London: Indian Dyestuff Inds. Ltd., 3,000 kgs., Rs. 2,22,-975.

DINITRO CHLORO BENZENE: To Kobe: Kalyani Steels Ltd., 16,-500 kgs., Rs. 3,04,841.

GUAR GUM: To Antwerp: Premcem Gums Pvt. Ltd., 5,000 kgs., Rs. 1,85,000; To Hamburg: Bagadia International, 20,000 kgs, Rs. 5,86,572; To Mombasa: Indian Products Trading Corp. Ltd., 10 MTs., Rs. 3,10,000.

IODINE POWDER: To Hong Kong: Santosh Pharmaceuticals, 3,000 kgs., Rs. 7,33,216.

ISOPROTURON TECH: To Antwerp: Montari Industries Ltd., 20 MTs., Rs. 22,42,455.

MALATHION TECH: To Antwerp: Ficom Organic Pvt. Ltd., 18 MTs., Rs. 5,57,159.

META AMINO PHENOL: To Hamburg: Ogranic Chemicals Ltd, 16,300 kgs., Rs. 22,80,848.

META UREIDO ANILINE HCL: To Yokohama: Sunbeam Mono[illegible]m Pvt. Ltd., 472.5 kgs., Rs. [illegible]

METANILIC ACID: To Rotterdam: Jeevan Products, 14,500 kgs., Rs. 5,01,552; Sadhana Nitro Chem Ltd., 14,000 kgs., Rs. 4,81,600.

NICOTINE SULPHITE: To Kobe: Shreeji Auto Produce, 3,000 kgs., Rs. 1,00,000; To Yokohama: Unitrust Nicotine Inds., 29,700 kgs.; 14,10,000.

NITRO AMINO PHENOL: To Hamburg: Mangalya Trading Investment Pvt. Ltd., 1,666.660 kgs., Rs. 1,13,600.

NITROCHLOROBENZENE: To Kobe: Chemie Synth Pvt. Ltd., 16,530 kgs., 2,99,642.

ORGANIC CHEMICALS: To Bangkok: Siddarth Dye-Chem Industries, 2,000 kgs., Rs. 2,20,-648.

P-ANISIDINE 99% FLAKES: To Hamburg: Hiremath Chemicals Ltd., 2,000 kgs., Rs. 1,34,929.

PHOSPHOROUS TRICHLORIDE: To Aqaba: Trenton Investments Co. Pvt. Ltd., 38,400 kgs. Rs. 5,84,254.

POTASSIUM IODIDE: To Hamburg: Lubcut Incorporation, 2,500 kgs., Rs. 5,95,706.

SODIUM META NITRO BENZENE SULPHONATE: To Rotterdam: Sadhana Nitrochem Ltd., 14,000 kgs., Rs. 2,81,130.

STANNOUS SULPHATE: To Bremen: National Marketing Corporation, 3,000 kgs., Rs. 2,75,-618.

SULPHONIC SODIUM: To Kobe: Jansons International, 6,000 kgs., Rs. 1,18,727.

SULPHO ANTHRAQUINONE : To New York: Indian Dyestuff Inds. Ltd., 2,550 kgs. Rs. 80,-100.

UREIDO ANILINE: To Antwerp: Sunbeam Monochem Pvt. Ltd., 2,382 kgs., Rs. 1,47,915.

VINYL SULPHONE: To New York: Sagar Drugs and Pharmaceuticals, 17,200 kgs., Rs. 11,13,-470

ZINC STEARATE: To Beira: H[illegible]cc Products Ltd., 7,000 kgs., R[illegible] 2,47,350.

DYE MATERIALS EXPORTED BOMBAY

(From 9-8-88 to 13-8-88)

ACID GREEN: To Busan: Jansons International, 300 kgs., Rs. 92,014.

AURAMINE O CONC.: To Kaohsiung: Jindal Dye Intermediate Pvt. Ltd., 10,000 kgs., Rs. 5,-22,000.

BON ACID: To New York: Beta Naphthol Pvt. Ltd., 5,000 kgs., Rs. 3,42,756.

CH ACTIVE RED HC 7B : To Antwerp: Chemiequip Ltd., 1,000 kgs., Rs. 1,05,300.

COALTAR DYES: To Chittagong: Dintex Dyechem Inds., 700 kgs., Rs. 89,046.

COLOUR CHEM BLACK FBRK: To Chittagong: Colour Chem Ltd., 550 kgs., Rs. 9,858.

COLOUR CHEM RED FGR: To Chittagong: Colour Chem Ltd., 1,500 kgs., Rs. 1,73,597.

DICHLORO ANTHRAQUINONE: To New York: Indian Dyestuff Inds. Ltd., 3,796 kgs., Rs. 6,36,300.

DIRECT TURQUOISE BLUE: To Keelung: Devarsons Pvt. Ltd., 1,000 kgs., Rs. 51,500.

DYES: To Chittagong: Atic Industries Ltd., 800 kgs., Rs. 2,50,-174; Texdyes Corpn., 208 kgs., Rs. 24,318.

DYESTUFF: To Chittagong: Associated Intermediates, 80 kgs., Rs. 6,000.

DYE INTERMEDIATE: To Antwerp: Priya Chemicals, 9,492 kgs., Rs. 6,60,077; To Bangkok: Indian Dyestuff Industries Ltd., 500 kgs., Rs. 61,500; Tata Exports Ltd., 7,000 kgs., Rs. 1.55,-050; To Busan: Megatul Chemi-

als Pvt. Ltd., 5,000 kgs., Rs. ,25,000; To Chittagong: Amrit-al Chemaux Ltd., 250 kgs., Rs. 24,715; To Hamburg: Mentor Chemicals & Pharma, 2,500 kgs., Rs. 2,43,788; Priya Chemicals. 1,250 kgs., Rs. 89,572; To Hong Kong: International Dyestuff Inds., 14,360 kgs., Rs. 14,81,979; To Kobe: Jay Chemical Industries, 28,050 kgs., Rs. 28,55,000; To La Havre: Vishnu Chem Intermediates Pvt. Ltd., 15,480.650 kgs., Rs. 16,27,000; To New York: Nu-an Dye Chem, 6,500 kgs., Rs. 5,67,420: To Rotterdam: Atul Products Ltd., 6,200 kgs., Rs. 9,55,-400.

GOLDEN YELLOW FRG: To Chittagong: Colourchem Ltd., 30 kgs., Rs. 61,767.

H-ACID: To Felixstowe: Agarval Mar. Pvt. Ltd., 6,350 kgs., Rs. 5,56,122; To Hamburg: Sajan Impex Pvt. Ltd., 1,450 kgs., Rs. 10,94,633; Vishnu Chem Intermediates Pvt. Ltd., 13,004.62 kgs., Rs. 12,22,236; To La Hevre: Sandoz India Ltd., 6,-400 kgs., Rs. 6,23,992.

H-ACID: To New York: Jansons International, 7,300 kgs., Rs. 5,-27,858; Rang Udyog, 9,294 kgs., Rs. 7,79,816; To Osaka: Archana Finance Corpn., 1,244.5 kgs., Rs. 1,14,982; To Rotterdam: Jindal Dye Intermediate Pvt. Ltd., 5,238.9 kgs., Rs. 5,13,245.

H-ACID MONO SODIUM SALT POWDER: To Rotterdam: Sunbeam Monochem P. Ltd., 6,024.00 kgs., Rs. 6,12,466.

H-ACID POWDER: To Yokohama: Liberty Exports Pvt. Ltd., 6,640 kgs., Rs. 16,96,113.

K-ACID: To Kobe: Metro Chem Industries, 7,437.9 kgs., Rs. 4,-2,565.

K-ACID TRISULPHONIC ACID OI POTASSIUM SALT: To Keelung: Jansons International, 9,136.40 kgs., Rs. 5,22,445.

MAGENTA P POWDER: To Liverpool: Kashmir Govt. Arts Emporium, 1,000 kgs., Rs. 12,648.

MALACHITE GREEN: To Montreal: Ravi Chem Dye, 750 kgs., Rs. 65,851.

METANIL YELLOW: To Aden: Esufali Akbarali Co., 2,000 kgs., Rs. 62,890.

MONAZOL BLACK: To Antwerp: Monarch Dyestuff Inds., 2,500 kgs., Rs. 1,72,166.

NAVIZOL BLACK MSRL: To Rotterdam: Indian Dyestuff Inds. Ltd., 1,000 kgs., Rs. 76,357.

NAVINON BLACK: To Rotterdam: Indian Dyestuff Inds. Ltd., 2,000 kgs., Rs. 4,27,732.

NAVINON BLUE RSN: To Norfolk: Indian Dyestuffs Inds. Ltd., 4,000 kgs., Rs. 13,38,800.

NAVINON DARK BLUE: To Rotterdam: Mangalya Trading Investments Pvt. Ltd., 1,000 kgs., Rs. 2,15,500.

NAVINON GREY 3B: To Rotterdam: Mangalya Trading Investments Pvt. Ltd., 1,800 kgs., Rs. 7,11,700.

NAVINON JADE FFB: To Rotterdam: Indian Dyestuff Inds. Ltd., 1,000 kgs., Rs. 2,98,795.

NOVATIC OLIVE PURE: To Liverpool: Atic Industries Ltd., 2,212.97 kgs., Rs. 11,72,615.

OPTICAL WHITENING AGENT: To Bangkok: Indian Dyestuff Industries, 17,500 kgs., Rs. 6,48,-076; To Colombo: Bhagvandas Manganlal Shah, 500 kgs., Rs. 12,500.

ORANGE FR: To Chittagong: Colour Chem Ltd., 200 kgs., Rs. 11,731.

ORGANIC DYES: To Chittagong: Associated International, 150 kgs., Rs. 14,000.

PHENYL J. ACID: To Manchester: Atul Products Ltd., 1,000 kgs., Rs. 1,84,396.

REACTIVE BLUE 1: To Keelung: Brinda Exports Agencies, 3,000 kgs., Rs. 2,68,000.

REACTIVE TURQ. BLUE: To Rotterdam: Mehita Dyechem Pvt. Ltd., 1,000 kgs., Rs. 1,47,515.

REACTIVE T BLUE H5G: To New York: Jansons International, 2,000 kgs., Rs. 1,67,491.

REACTOFIX SUPRA BLUE H3RL: To Rotterdam: Jaysynth Dyechem Pvt. Ltd., 2,000 kgs., Rs. 5,09,440.

REACTOFIX SUPRA GOLDEN YELLOW HE: To Rotterdam: Jai Chemicolour Industries, 500 kgs., Rs. 1,19,228.

REACTOFIX SUPRA GREEN H6BL: To Rotterdam: Jaysynth Dyechem Pvt. Ltd., 500 kgs., Rs. 86,219.

REACTOFIX SUPRA PURE BLUE H2GP: To Antwerp: Jaysynth Dyechem Pvt. Ltd., 750 kgs., Rs. 77,212.

REACTOFIX SUPRA YELLOW HGRL: To Rotterdam: Jaysynth Dyechem Pvt. Ltd., 1,000 kgs., Rs. 1,55,134.

RHODAMINE B BASE: To Felixstowe: Sahyadri Dyestuff Chemicals Co., 1,050 kgs., Rs. 2,-10,000.

SYNTHETIC COALTAR DYES: To Antwerp: Jindal Dye Intermediate Pvt. Ltd., 2,000 kgs., Rs. 2,46,000; To Chittagong: Atic Industries Ltd; 50 kgs., Rs. 34,411; To Colombo: Atul Products Ltd., 2,000 kgs., Rs. 1,48,612; To Hamburg: Jaysynth Dyechem Pvt. Ltd., 925 kgs., Rs. 1,70,807; To Hong Kong: Bhoir Import Export Pvt. Ltd., 11,500 kgs., Rs. 11,-89,925; To Kobe: United Chemicals, 3,000 kgs., Rs. 2,74,912 To Liverpool: Jindal Dye Intermediates Pvt. Ltd., 1,500 kgs., Rs. 1,25,000; To Liverpool: K. Patel Chemo Pharma Pvt. Ltd., 500 kgs., Rs. 97,000; To Mombasa: Gudhka Brothers, 750 kgs., Rs. 51,275; To Mombasa: Ind. Prod. Trad. Co. Pvt. Ltd., 4,000 kgs., Rs. 4,19,000; To Mombasa: Jaysynth Dyechem Pvt. Ltd., 800 kgs., Rs. 1,30,035; Mangalya Trading & Investment Pvt. Ltd., 750 kgs., Rs. 74,850; Roffe Impex Inter. Pvt. Ltd., 1,200 kgs., Rs. 64,482; To Rotterdam: Mangalya Trading and Investments Pvt. Ltd., 1,500 kgs., Rs. 2,96,-400.

SYNTHETIC INGRAIN BRILLIANT BLUE: To Kobe: Western Chem Co., 2,000 kgs., Rs. 2,-94,699.

SYNTHETIC ORGANIC DYES: To Antwerp: Priya Chemicals, 2,000 kgs., Rs. 1,82,335.

SYNTHETIC ORGANIC PIGMENTS (INDIAN ORIGIN): To Bangkok: Chika Ltd., 3,500 kgs., Rs. 4,71,519.

SYNTHETIC ORGANIC DYESTUFF: To Bangkok: Lotus Enterprises, 1,000 kgs., Rs. 1,63,200.

SYNTHETIC ORGANIC DYES: To Charleston: K. Uttamlal Pvt. Ltd., 3,700 kgs., Rs. 3,90,106.

SYNTHETIC ORGANIC DYESTUFFS: To London: Dintex Dyechem Industries, 1,000 kgs., Rs. 93,915; To Rotterdam: Kabbur Industries Pvt. Ltd., 1,000 kgs. Rs. 1,26,487.

TERENIX RED FBL: To Rotterdam: Jaysynth Dyechem Pvt. Ltd., 2,000 kgs., Rs. 5,29,503.

TOLUIDINE RED (INDIAN): To Aden: Sudarshan Chem. Ind. Ltd., 4,000 kgs., Rs. 4,00,582.

TURQUOISE BLUE RBL: To Antwerp: Sanjay Sales Corpn., 2 MTs., Rs. 1,08,424.

ULTRAMARINE BLUE: To Colombo: CMC India Ltd., 27,500 kgs., Rs. 3,30,400.

DRUG MATERIALS EXPORTE BOMBAY

(From 9-8-88 to 13-8-88)

ALUMINIUM HYDROXIDE DRIED GEL BP/USP: To Hamburg: Taurus Chemicals Pvt. Ltd., 5,00 kgs., Rs. 1,26,600.

CHLORPHENIRAMINE MALEATE BP 80: To Hong Kong: Venkatarama Chemical Ltd., 550 kgs. Rs. 2,58,500.

DI IODOHYDROXYQUINOLINE USP XXI: To Hamburg: G. Amphray Laboratories, 1,000 kgs., Rs 3,06,954.

ERYTHROMYCIN STEARATE BP 80: To Hamburg: Chemox Marketing Associates Pvt. Ltd., 1,300 kgs., Rs. 10,78,727; Lawande Pharmaceuticals Pvt. Ltd., 1,500 kgs., Rs. 12,48,085.

HARMLESS DRUGS: To London: G, Amphray Laboratories,

MEBENDAZOLE USP 21 : To Hamburg: Pefco Industries Ltd., 1,000 kgs., Rs. 5,24,664.

PARACETAMOL USP XXI: To New York: Farmson Pharmaceutical, 11,500 kgs., Rs. 7,18,021.

POTASSIUM IODIDE BP: To Whampoa: G. Amphray Laboratories Ltd., 10,000 kgs., Rs. 23,-49,116.

POTASSIUM IODIDE USP: To Hamburg: G. Amphray Laboratories, 2,500 kgs., Rs. 5,79,253.

SODIUM IODIDE USP: To Hamburg: G. Amphray Laboratories, 1,000 kgs., Rs. 2,60,028.

SULPHAMETHOXAZOLE : To Hamburg: Chemox Marketing Associates Pvt. Ltd., 10,000 kgs., Rs. 22,26,148

SULPHAMETHOXAZOLE BP 80: To Hamburg: Metropolitan Industries, 5,000 kgs., Rs. 13,-58,843.

RUG MATERIALS IMPORTED MADRAS

(From 1-3-89 to 9-3-89)

CARBAMAZEPINE BP: From ong Kong: The Reward Pharma- uticals, 50 kgs., Rs. 60,541.

CITRIC ACID MONOHYDRATE P 80: From China: Harish Bro- ers, 52.5 MTs., Rs. 7,11,408.

DOPAMINE HCL USP: From RG: Pharma Research & Analy- cal Lab., 40 kgs., Rs. 1,22,969.

GRISEOFULVIN BP: From Den- ark: American Remedies Pvt. td., 150 kgs., Rs. 1,28,081.

GRISEOFULVIN BP 80: From RG: Tablets (India) Ltd., 210 gs., Rs. 1,90,351.

LOPERAMIDE HCL USP: From aly: Retort Pharmaceuticals Pvt. td., 10 kgs., Rs. 79,043.

RIFAMPICIN: From Belgium: he World Health Organisation, 21 kgs., Rs. 5,00,072.

DYE MATERIALS IMPORTED MADRAS

(From 1-3-89 to 9-3-89)

SAVINYL GREEN 2 GLS: From rance: Tata Exports Ltd., 10 gs., Rs. 6,791.

SUPRA BLUE B 2 RL: From Hong Kong: Ven Poon Tannery, 1,600 kgs., Rs. 63,338.

PLASTIC MATERIALS IMPORTED MADRAS

(From 1-3-1989 to 9-3-1989)

CAPROLACTUM: From Ne- herlands: Shriram Fibres Ltd., 187 MTs., Rs. 53,81,119.

EPOXY RESIN: From Japan : Ceat Tyres of India Ltd., 1,206 kgs., Rs. 1,03,909; Electronic Research Ltd., 2,700 kgs., Rs. 2,28,595 ; From FRG: Kothari Electronics Inds. Ltd., 6,360 kgs., Rs. 4,16,253; From Japan: V.V. Rama Rao & Co., 2,600 kgs., Rs. 1,66,262.

HDPE: From Hungary: Jampex Enterprises, 30 MTs., Rs. 499,- 743; From Japan: Ganesh Agro Pack Pvt. Ltd., 10 MT., Rs. 1,- 90,879; Polyspin Pvt. Ltd., 25,- 000 kgs., Rs. 4,77,184; From Portugal: Alagiri Spinning & Weaving Mills Pvt. Ltd., 33,000 kgs., Rs. 6,43,059; Ganesh Ag- ro Pack Pvt. Ltd., 16,500 kgs., Rs. 3,14,442; Polyspin Pvt. Ltd., 99,000 kgs., Rs. 18,86,548; From Singapore: Asian Bags Pvt. Ltd., 17,000 kgs., Rs. 2,46,459; Shammena Enterprises, 17 MT., Rs. 2,60,008; Southern Petro- chemicals Inds. Corpn., Ltd., 100 MT., Rs. 17,52,027; Ultra- marine and Pigments Ltd., 17 MT., Rs. 2,73,301

PVC RESIN: From Japan: Su- per Tech Battery Corporation, 500 kgs., Rs. 10,962.

POLYPROPYLENE: From FRG: Soladur System I Pvt. Ltd., 175 kgs., Rs. 8,470; From Singa- pore: Ananth Plastics Pvt. Ltd., 16 MTs., Rs. 2,75,276; Chola Packaging Pvt. Ltd., 48,000 kgs., Rs. 8,14,063; Swathi En- terprises, 16 MTs., Rs. 2,82,- 584; Ultramarine & Pigments Ltd., 32,000 kgs., Rs. 4,94,838; Wonder Plastics, 16 MT., Rs. 2,82,504.

POLYSTYRENE : From FRG: Revathi Electronics Ltd., 315 kgs., Rs. 80,345.

SYNTHETIC RESIN: From UK: Voltas Ltd., 14,000 kgs., Rs. 4,- 04,996.

PLASTIC MATERIALS IMPORTED 14-2-1989

CAPROLACTAM : From Ne- therlands: The National Rayon Corpn. Ltd., 153 MTs., Rs. 44,- 07,546.

HDPE: From Czechoslovakia: Associated Plastic Inds., 1,12,- 500 MTs., Rs. 14,02,632; Uni- ted Brothers, 12.500 MTs., Rs. 1,55,848 ; Hukam Chand and Sons 25 MTs., Rs. 3,11,696; Jyomko, 25 MTs., Rs. 3,11,- 696; Mehta Traders, 25 MTs., Rs. 3,11,696: From Saudi Arabia Brite Auto and Plas. Ltd., 49.500 MTs., Rs. 8,48,794; From Yu- goslavia: Indsexim HOF, 37 MTs., Rs. 6,51,361.

LLDPE: From Saudi Arabia: V.I.P. Industrial Ltd., 101.880 MTs., Rs. 15,99,500.

PVC RESIN: From FRG: An- chenco Ltd., 1250 kgs., Rs. 2,- 40,155; Indian Cork Mills Ltd., 3,000 kgs., Rs. 15,53,696; From Mexico: Amar Deoplastic Inds., 50 MTs., Rs. 8,73,129; From Romania: V. P. Asbestos Ltd., 3,000 kgs., Rs. 63,869.

POLYPROPYLENE : From Aus- tralia: Mewar Polyester Pvt. Ltd., 32 MT., Rs. 5,36,520; Plasti Weave Industries, 32 MT., Rs. 5,36,520; From Czechoslovakia; Naresh Paper Bag Company, 56 MTs., Rs. 7,23,588; From Italy: Godrej and Boyce Mfg. Co. Ltd., 30 MTs., Rs. 6,28,449.

POLYSTYRENE RESIN: From Korea: Northern packing group of Industries, 9,000 kgs., Rs. 2,53,- 780.

MATERIALS IMPORTED BOMBAY 14-2-1989

ACETO ACETANILIDE: From Switzerland: Sudarshan Chemi- cals Inds., 728 kgs., Rs. 36,- 063.

ALUMINIUM OXIDE SYNTHE- TIC: From Japan: Grindwell Nor- ton Ltd., 6,000 kgs., Rs. 2,43,- 172.

BENZALDEHYDE FFC GRA- DE: From USA: Tata Exports Ltd., 51,954 kgs., Rs. 4,04,222.

BENTONITE CLAY: From USA: Whitecroft Pharmaceuticals Pvt. Ltd., 317.52 kgs., Rs. 43,508.

BUTYL ACRYLATE: From FRG: Exim India, 7,020 kgs., Rs. 1,-97,949.

BUTYL TITANATE: From United Kingdom: Dr. Beck and Co (I) Ltd., 10,000 kgs., Rs. 4,80,-124.

CARBON BLACK: From China: Monali Traders, 50 MTs., Rs. 4,-16,108; From Korea: Nirlon Syn. Fibers and Chem Ltd., 63 MTs., Rs. 7,73,000; From Mexico: Modi Rubber Ltd., 90,720 kgs., Rs. 9,81,759.

CHLOROQUIN PHOSPHATE : From China: Mercury Laboratorles Pvt. Ltd., 757.50 kgs., Rs. 2,47,965.

CHROMIUM CARBIDE: From United Kingdom: Mukund Iron and Steel Works Ltd., 3000 kgs . Rs. 29,396.

CRESYLIC ACID: From Japan: Dr. Beck and Co (I) Ltd., 50,000 kgs., Rs. 11,81,259.

CUPROUS CHLORIDE: From Japan: Supreme India Intl, 200 kgs., Rs. 1,30,217.

CYANOETHYL-N-ETHYL ANILINE: From USA: Nirup Synchrome Ltd., 3,445.27 kgs., Rs. 2,19,576.

CYANURIC CHLORIDE: From FRG: Appex Dyestuff Industries, 1,000 kgs., Rs. 47,310; From Switzerland: Bharat Chemical and Ayurvedic, 8000 kgs., Rs. 3,64,721; From FRG: Chhaya Dyes and Chemicals, 500 kgs., Rs. 23,655; Gandhi Shal Chemicals Industries, 500 kgs., Rs. 23,655; Hira Dye Chem Industries, 1000 kgs., Rs. 47,310; India Textiles Products, 2000 kgs., Rs. 94,621; Intermediates Pvt. Ltd., 500 kgs., Rs. 23,655; Janki Dye Chem Pvt. Ltd., 1,000 kgs., Rs. 47,310; Umesh Industries, 1000 kgs., Rs. 47,310.

DANE SALT : From Netherlands: Gujarat Lyka Organics Ltd., 2000 kgs . Rs. 6,55,409

DI BUTYL TIN OXIDE: From FRG: Crystal Polymers and Additivies, 4000 kgs., Rs. 6,36,546.

DI CALCIUM PHOSPHATE : From USA: Colgate Palmolive (I) Ltd., 52,254 kgs., Rs. 7,65,598.

DI ETHYL OXALATE: From China: Metro Exporters Pvt. Ltd., 32,000 kgs., Rs. 9,26,718; Priya Chemicals, 16,000 kgs., Rs. 4,-85,673.

DIETHYL THIOPHOSPHANOYL CHLORIDE: From USA: Cyanamid India Ltd., 79,832.960 kgs., Rs. 29,81,205.

DI OCTYL TIN OXIDE: From Japan: A.L.A. Chemicals Ltd., 1,000 kgs., Rs. 1,44,278.

EPICHLOROHYDRINE : From Japan: Electrical Controls and Systems, 2,400 kgs., Rs. 66,578.

ETHYL FORMATE: From FRG: CIPLA, 1080 kgs., Rs. 48,308.

1.6 HEXANE DIOL: From FRG: Indian Dyestuff Inds., Ltd., 5000 kgs., Rs. 2,90,315.

HEXYNE DIOL : From FRG: Grauer and Weil (I) Ltd., 1,650 kgs., Rs. 1,72,587.

HYDROXYLAMINE SULPHATE: From Japan: Apte Amalgmations Ltd., 34,825 kgs., Rs. 11,28,-379.

HYDROXY PROPYL ETHYLENE DIAMINE: From FRG: Grauer and Weil (I) Ltd., 1,800 kgs., Rs. 79,586.

HYDROXY QUINALDINE CARBOXYLIC ACID: From FRG: B.R. Industries, 697.7 kgs., Rs. 2,-55,666.

IODINE CRUDE: From Japan: Atul Products Ltd., 2,000 kgs., Rs. 6,03,585.

ISO PHTHALIC ACID : From USA: Revex Plasticisers Pvt. Ltd., 6,126 MTs., Rs. 88,70

LIQUID BROMINE: From Israel: Chamundi Organic Pvt. Ltd., 11,340 kgs., Rs. 2,78,281.

META TOLYLENE DIAMINE From FRG: Gupta Trading Co 10,000 kgs., Rs. 4,12,892.

METHYL HESPERIDINE 90 MIN: From Japan: Cadila Laboratories Pvt. Ltd., 150 kgs., Rs 2,12,856.

MONOCROTOPHOS TECH From Switzerland: Hindustan Pulverising Mills 1,980 kgs., Rs. 1,46,371; Pesticides India, 14 960 kgs., Rs. 13,38,484.

MONOPHENYL GLYCOL: From Japan: Dr. Beck and Co (I) Ltd., 16,000 kgs., Rs. 8,60,777.

NN DIMETHYL ANILINE : From Spain: Satyawati Chemicals, 15,600 kgs., Rs. 4,28,009.

NITRIC AMINO AMYL PHENOL: From Japan: Indian Dyestuff Inds. Ltd., 1,565 kgs., Rs. 8,28,733.

PARACUMIDINE: From Japan: Hoechst India Ltd., 30,400 kgs., Rs. 23,43,562.

PARAFORMALDEHYDE 96% PRILLS: From Spain: Goodlass Nerolac Paints Ltd., 16,000 kgs., Rs. 1,40,227; Sudarshan Chemical Industries, 6,012 kgs., Rs. 54,524.

PENTAERYTHRITOL: From Japan: Modi Industries Ltd., 36.82 MTs., Rs. 6,91,975.

PIVALOYL CHLORIDE : From FRG: Gujarat Lyka Organics Ltd., 4,140 kgs., Rs. 2,59,967.

POLYVINYL ALCOHOL: From China: Miracnem Industries, 5 MTs., Rs. 91,452; From GDR: Cosmo Ferrites Ltd., 5.00 MTs., Rs. 1,43,954; From Japan: Atlas Syntex Pvt. Ltd., 6.500 MTs., Rs. 2,92,648; Yogiware Fabrics Pvt. Ltd., 1500 MTs., Rs. 70,-876.

PROPYLENE GLYCOL : From Japan: Satyen Chemical Industries, 16,170 kgs., Rs. 2,98,221.50

ACETAMIDE
AMMONIUM BROMIDE
AMMONIUM CHLORIDE
AMMONIUM MOLYBOATE
AMMONIUM IODIDE
CALCIUM SULPHATE
CALCIUM NITRATE
COBALT SULPHATE
COPPER SULPHATE
COPPER CARBONATE
CUPROUS IODIDE
CUPROUS NITRATE
CALCIUM CHLORIDE
CALCIUM STEARATE
CHROMIUM CHLORIDE
CREAM OF TARTAR
D.A.P.
E.D.T.A.
FERROUS SULPHATE
FERRIC CHLORIDE
GUM ROSIN
HYPO
LACTIC ACID
LITMUS
MALEIC ACID
MANGANESE SULPHATE
MAGNESIUM STEARATE
MAGNESIUM SULPHATE
MOLYBDIC ACID
MAGNESIUM NITRATE
MAGNESIUM OXIDE
NICKEL SULPHATE
NICKEL CARBONATE
POTASSIUM BROMIDE
POTASSIUM NITRITE
POTASSIUM ACETATE
POTASSIUM IODIDE
POTASSIUM BROMATE
POTASSIUM IODATE
BISULPHATE POT. META
POT. META BISULPHITE
SODIUM BENZOATE
SODIUM CITRATE
STRONTIUM CHLORIDE
SODIUM BROMIDE
SODIUM MOLYBDATE
SULPHUR
TRI SODIUM PHOSPHATE
TUNGSTIC ACID
ZINC SULPHATE
ZIRCONIUM SILICATE

403, "YOGESHWAR" 135/139, Kazi Syed Street, Bombay-400 003.
Tele. Offi. : 326542.331195 Grams: "SULPHATES"
Resi. : 5112967. Chinchbunder

YOGI DYE CHEM INDUSTRIE

Consumers & Exporters

CONTACT FOR YOUR REQUIREMENTS OF :

P.T.S. Acid
P.T.S. Chloride
Para Toluene Sulphonamide
Sodium Saccharine Soluble

NAV BHARAT MINERALS & CHEMICALS

8, Haresh Chambers, 313/319, Samuel Street, Bombay-400 003.
Phones : 320510 * 338457 * 343429

ACID SLURRY SOFT/HARD
AMMONIUM CARBONATE
ALUMINIUM OXIDE
ALUMINIUM STEARATE
ALUMINIUM CHLORIDE
BASIC CHROMIUM SULPHATE
BARIUM SULPHATE
BARIUM PEROXIDE
BARIUM CHLORIDE
CALCIUM FLUORIDE
CALCIUM NITRATE
CALCIUM CHLORIDE
CUPRIC CHLORIDE
DI CALCIUM PHOSPHATE
GYPSUM POWDER
IRON SULPHIDE STICK
LEAD ACETATE
MAGNESIUM CARBONATE
MONO POTASSIUM PHOSPHATE
MAGNESIUM OXIDE LIGHT
NICKEL CHLORIDE
NICKEL SULPHATE
OXALIC ACID
POTASH ALUM
POTASSIUM NITRATE
PINE OIL
POTASSIUM FERRICYANIDE
POTASSIUM PERSULPHATE
POTASH CHROME ALUM
POTASSIUM CARBONATE
PHOSPHORIC ACID
SODIUM ALUMINATE
SODIUM FLUORIDE
SODIUM ACETATE
SODIUM SULPHITE
SODIUM BISULPHITE
SULFAMIC ACID
SANTOBRITE
SODIUM MONOCHLORO ACET
TETRA SODIUM PYRO PHOSPHATE
TRI CALCIUM PHOSPHATE
ZINC ACETATE
ZINC NITRATE

VORA CHEMI TRADE PVT. LTD.

265, Samuel Street, Bombay-400 003
Phones : 333762 63 64/325265 345377

REGD. NO. TN/MS (C) 395 ISSN 0045/6500 R. N. NO. 197